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ABSTRACT

This report comprises a detailed evaluation of two minicomputer-based school information management systems for use at the senior high school level: (1) Prompt Automated Scheduling System (PASS) by Mid-American Corporation and locally developed software, which runs on an IBM minicomputer, and (2) Student Administration System (SAS) by SIERRA Software Systems, Inc., which runs on the Digital Equipment VAX family of computers. These two systems were evaluated against six major factors, each defined by a detailed and comprehensive set of criteria: product scope and function, ease of use, technical considerations, support and services, product qualifications, and vendor. All key system capabilities were tested as they related to database creation and maintenance, prescheduling, scheduling, transition to operational status (and semester turnover), attendance recording and reporting, progress recording and reporting, report generation, and utility functions. Each product evaluation describes the testing environment and conditions, lists evaluation results and observations, and summarizes the strengths and weaknesses of the system. Evaluation data are then summarized and compared first from the senior and then from the junior high school perspective. Results indicate that considerable development work is required for both systems to realize complete school information management systems, and that these minicomputer-based systems are not suitable for use by individual schools. Six appendixes are included: the general questionnaire from which the criteria were derived, the interview guide and detailed checklist, the detailed scoring comparison form, Mid-American PASS screen and program functions, IBM 4341 to VAS 11/725 data transfer, and recent system developments. (TE)

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Minicomputer-Based Student Information Management Systems in Alberta Schools

Edmonton Public Schools

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EA 018 499

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MINICOMPUTER BASED SCHOOL INFORMATION MANAGEMENT SYSTEMS (SIMS) IN ALBERTA JUNIOR AND SENIOR HIGH SCHOOLS

FINAL REPORT

by

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1.0 INTRODUCTION

Until fairly recently, those major school administration functions which were addressed by computers, were central, mainframe - based applications. Over time, minicomputers and microcomputers have increased in power and become more affordable. There are now several comprehensive administrative systems available for such computers. School administrators are becoming increasingly interested in the local application of computer technology to school information management. While microcomputers have very low price to performance ratios they are almost always limited to a single user and a single task at any one time. Minicomputer systems are considerably more powerful in terms of the processing speed, number of users (typically eight) and sophistication and power of the operating system and database management system.

Among the computer based applications which exist for school administrators today are School Information Management Systems (SIMS) with a particular focus on student related information. These systems may be microcomputer or minicomputer based and, typically, incorporate four major modules which address school records, student scheduling, student attendance and marks or progress reporting. Usually, there is a high degree of integration between the modules which means, for example, that duplicate data bases are not required. In most cases, the cost of these software systems belies their complexity. Four thousand dollars buys multi-megabytes of software opportunity. In all cases, it is safe to assume that the cost of the software system itself will be the least impacting factor in any decision to apply it.

The purpose of the work which is reported on here was to evaluate the comparative suitability of two minicomputer based SIMS for use at the senior high school level. One of these SIMS focussed on the evaluation of commercially available software which runs on the DEC VAX family of computers. The second featured a combination of purchased and locally developed software which runs on an IBM minicomputer. This project was part of a wider investigation of SIMS alternatives for high school use. Specifically, Edmonton Public Schools and Alberta Education jointly funded the investigation of microcomputer based approaches to school information management as well. This latter initiative is the focus of a separate report. All investigations (of both mini and microcomputer based systems) were performed according to a thorough and objective evaluation process which was developed specifically for the purpose. The approach to evaluation is described in detail in a report entitled Selection Criteria for Integrated School Information Management Systems (available from Alberta Education).

In view of the extremely high level of interest in this area, the scope of the project was widened to include the junior high school perspective. The systems evaluated were:

- Prompt Automated Scheduling System (PASS) by Mid-American Corp.and locally developed software
- Student Administration System (SAS) by SIERRA Software Systems Inc.

The PASS alternative was complemented by a significant amount of locally developed software (e.g. an attendance tracking and reporting system).

The evaluation of the PASS centred system began in 1983. Development of integrated attendance and database updating software was completed in January 1984. The system is now in live use at Jasper Place Composite High School. The SAS evaluation started in October 1984 and was completed in February 1985.

The PASS centred system, was tested on an IBM Series 1 minicomputer; the SAS package was tested on a Digital Equipment VAX 11/725 minicomputer.

2.0 APPROACH TO EVALUATION

2.1 Evaluation Criteria

The two systems under investigation were evaluated against six major factors. These major evaluation factors were:

o Product Scope and Function	(what does it do and how well does it do it)
o Ease of Use	(User friendliness)
o Technical Considerations	(system design, structure, operation, etc.)
o Support and Services	(after sales service)
o Product Qualifications	(product credibility, history, etc.)
o Vendor	(who stands behind the product)

Each of the six major evaluation factors was defined by a detailed and comprehensive set of criteria. Information gained from consultations with schools was paramount in the development of the criteria. The criteria were developed through a six step process as outlined below:

Step 1 A General Questionnaire (see Appendix 1), Interview Guide and Detailed Checklist (see Appendix 2) were developed for the gathering of Information from the schools. These documents were developed using information gained through prior, extensive contact with schools in general, through the experiences of Information Services staff, and with a working knowledge of the characteristics of currently available systems. The general questionnaire was designed to determine which features and characteristics a SIMS should include and, in many cases, their relative importance. Where measures of the relative importance of a criterion or characteristic were required, the questionnaire featured a simple four point "must, "important", "optional" and "not required" scale for respondents to check.

Step 2 Eighteen district schools were identified as a respresentative sample through which detailed school information management needs and requirements were confirmed. These schools were carefully chosen to reflect many of the key variables such as school level, size, programs, organization and operational style.

Step 3 The General Questionnaire was sent to the 18 identified schools together with a statement of its purpose and instructions for its completion. Participating schools were requested to give careful consideration to their responses to the questionnaire and to prepare for a follow-up interview. The questionnaire also allowed participants to respond to the needs and requirements not specifically identified in the survey.

Step 4 After allowing ample time for the completion of the questionnaire, follow-up interviews were conducted at each school using the Interview Guide and Detailed Checklist referred to previously. The purpose of this step was to clarify and confirm responses relative to the questionnaire. A key reason for the two stage information gathering process (questionnaire followed by the interview) was to allow the schools to first respond without external influence of any kind.

Step 5 Information gathered through the administration of the questionnaire and subsequent interviews was compiled and analyzed and used to determine the relative importance of selection criteria items. Particular attention was paid to the comments of participating schools since this sometimes led to the inclusion of additional criteria items which might otherwise have been missed.

Step 6 Simple qualitative and quantitative analysis of the questionnaire, its findings, and the results of the interviews led to the definition of the detailed criteria as well as to the determination of weighting factors. The detailed evaluation (or selection) criteria in tabular form and a description of the column entries are shown in the following pages.

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT SCOPE & FUNCTION	SCHOOL RECORDS					
	Pre-Registration/Enrollment					
	Create student record	15	____	____		
	- school student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address					
	Registration confirmation notice	3	____	____		
	Feeder school confirmation notice	2	____	____		
	TOTAL Pre-Registration/Enrollment	20	____	____	____	____
	Detailed Data Items					
	Student information	25	____	____		
	- school student I.D. - District student I.D. - Alberta Education student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address - telephone number					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE

	- emergency contact
	  - name
	  - telephone
	- entry information
	  - entry date
	  - registration code
	  - withdrawal code
	- previous schools (2)
	- homeroom instruction
	- counsellor
	- parent/guardian information (up to 4)
	  - name
	  - address
	  - telephone (home and business)
	  - relationship
	  - occupation
	- locker information
	  - number
	  - combination
	- student indebtedness
	- religious denomination
	- program type
	- number of credits earned
	  - this school
	  - other schools
	- academic history
	- travel information
	  - method
	  - distance
	  - bus pass information
	- parking information
	  - driver's licence
	  - licence plate
	  - parking space
	- medical information
	  - disabilities/behaviours
	  - medications
	  - allergies					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- date of last medical					
	- physician information					
	- health care number					
	- departure information					
	- date					
	- reason					
	- minimum of 6 user defined fields					
	Instructor Information	5				
	- instructor code					
	- name					
	- address					
	- telephone					
	- social insurance number					
	- language of instruction					
	- certificate number					
	- courses taught					
	- minimum of 6 user defined fields					
	Course information	15				
	- course code (5 character alpha-numeric)					
	- description					
	- pre-and co-requisites (minimum of 4)					
	- must handle"and"/"or"situation					
	- course type					
	- language of instruction					
	- course accreditation					
	- credit value (2 digits)					
	- pass/fail mark					
	- grade					
	TOTAL Detailed Data Items	45				

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	25				
	All reports and inquiries should be available for all or a specified range of records, in various sort orders. - class lists - homeroom lists - student name labels - student address labels - parent address labels - student I.D. cards - student data (alphabetical or numerical order) - parent data (alphabetical or numerical order) - instructor data (alphabetical or numerical order) - course data - student phone list - student name list - student grade list - feeder school list - locker information list - student population by instruction type - fee sheets					
	The system should allow production of user-defined reports/inquiries using available data.					
	TOTAL Reports/Inquiries	25				
	TOTAL SCHOOL RECORDS	90				

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	SCHEDULING					
	Detailed Data Items					
	- Course code - Course section					
	Manual scheduling (Arena Scheduling)	7				
	Pre-scheduling					
	Course Requests					
	manual entry	5				
	automated entry	9				
	- allow student to specify mandatory/ compulsory courses, - preferred courses, preferred alternatives, etc. - allow student to specify preferred section, semester, or instructor					
	Edit and validation of course requests	7				
	- checking of pre- and co-requisites in the current students' requests as well as history files - capability to override pre- and co-requisites - capability to complete pre-requisite checking for students from other District schools.					
	Pre-scheduling reports	9				
	- potential conflict matrix — for all or a specified range of courses. Additional selection criteria may be					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	based on the number of requests or the number of sections. - course tally - students with no requests - student course request list - min/max request list - min/max credit list - verification tickets - arena scheduling labels - students missing compulsory courses - students requesting specific course or group of courses					
	Master schedule builder					
	Capability to build a master schedule manually	6				
	automatically	9				
	Capability of handling a variety of Scheduling units	9				
	- full year - semester - trimester - quartermester - 6 week unit - any combination of the above					
	User defined timetable rotation/tumble	10				
	Flexible number of periods per day	10				
	Capability to specify exclusive male or female sections	5				
	Capability to maintain current and future year/semester master schedules	8				

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Scheduling Process					
	User defined scheduling sequence - low grades first - high grades first - A to Z - Z to A	6				
	Unscheduling of no-shows/withdrawals	5				
	Scheduling of individual student or small groups of students	6				
	Capability to reset all students or partially scheduled students	8				
	Capability to lock scheduling assignments for all students or a group of students	8				
	Restart capability	8				
	Course weighting/semester balancing (ensure even course load for students)	8				
	Blocking of courses	7				
	Section balancing	8				
	Class balancing (males-females)	4				
	Capability to keep scheduling open after school start while starting to use the attendance module	9				
	Scheduling Reports/Inquiries	10				
	- student timetables — grid and list format - instructor timetables — grid and list format - room timetables — grid and list format - master schedule - student scheduling conflicts - students partially scheduled - unassigned time					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Junior High Scheduling Requirements					
	Homeroom grouping for core subjects	9	____	____		
	Capability of scheduling any course in any combination and number of time periods	10	____	____		
	TOTAL SCHEDULING	200	____	____	____	____
	STUDENT ATTENDANCE					
	Entry of Attendance Data					
	manual entry	5	____	____		
	automated entry	9	____	____		
	Multiple user-defined absence types	8	____	____		
	Capability to record attendance data at various intervals	10	____	____		
	- daily - twice per day - period by period - subject by subject					
	Attendance history	8	____	____		
	- at least ten days detail - cummulative totals					
	Attendance reports/inquiries	10	____	____		
	- student by class - student by subject - student by period					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- homeroom attendance					
	- daily summary					
	- weekly summary					
	- monthly summary					
	- multiple absence					
	- capability to produce unexcused absence report for the current day within 30 minutes					
	- the system should allow user defined reports/inquiries using available data					
	TOTAL ATTENDANCE	50	___	___	___	___
	STUDENT MARKS					
	Entry of marks data					
	manual	5	___	___		
	automated	9	___	___		
	Marks data	10	___	___		
	- minimum of 4 term marks plus final mark					
	- letter or percentage grades					
	Student Exams	6	___	___		
	Exam timetable builder					
	- automated					
	- manual					
	Exam Reports/Inquiries					
	- potential exam conflict matrix					
	- exam schedules					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	10				
	proof list report cards - marks data - final mark, calculated according to - user-defined form - attendance data - class averages - honour lists - potential failure lists - graduation list					
	TOTAL STUDENT MARKS	40				
	UTILITY FUNCTIONS					
	Backup/Restore	12				
	Security/Controls	8				
	TOTAL UTILITY FUNCTIONS	20				
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	400				

EASE OF USE	- flexibility
	- modular, table driven
	  - help facilities
	  - menu driven
		60				

	GRAND TOTAL, EASE OF USE	60				

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
TECHNICAL CONSIDERATIONS	- hardware - system software environment - operating system - utilities - database management/system internals/files - networking capabilities - user hooks - modularity of the system	80	___	___		
	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80	☐	☐	☐	☐
SUPPORT & SERVICES	- local versus where/how far - package support and services - software support, custom modifications - documentation - user guide, application system, procedural, operations guide, file layouts - training - applications system, operational (DP), availability schedule, format, location, prerequisites - implementation - training - initialization (conversion, file set-up, output forms) - implementation plan	70	___	___		
	GRAND TOTAL, SUPPORT & SERVICES	70	☐	☐	☐	☐

(15)

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT QUALIFICATIONS		80				
	- package background - reliability - current development status - number of installations - product development plans - release concept, portability, verticality					
	GRAND TOTAL, PRODUCT QUALIFICATIONS	80				
VENDOR		70				

	- Corporate information
	  - background and history
	  - financial performance
	  - employee base
	- Market volatility and vendor stability
	- References
	- Contractual Terms
	  - maintenance
	  - warranty
	  - ownership rights
	  - discount structure/price limit					

	GRAND TOTAL, VENDOR	70				

The extreme left hand column of the tables shows the major evaluation factors. The column immediately to the right of this displays the criteria items. Major criteria items are underlined. Below each major criteria item is a list of detailed criteria. The detailed criteria are of two types - those against which the systems under evaluation will be scored and those which are to provide context for the scoring process. Criteria provided for context purposes are identified by a preceeding hyphen. Those criteria against which systems were scored can be identified by the presence of an entry in the column marked WEIGHT (weighting factor).

The column entries for the Criteria Tables are defined as follows.

Evaluation Factor - identifies a key area of evaluation and the beginning of a detailed criteria list for that particular factor.

Criteria Item - identifies a feature, process or attribute associated with the factor. The Criteria item column also contains supplementary entries intended to provide an evaluator with a more complete perspective on a particular criteria item being evaluated. Supplementary entries, which are identified by a preceeding hyphen, do not have a weight assigned to them.

Weight - is a measure of the relative importance of a criteria item to the user. Summing of weighting factors (or weights) gives a broad perspective of the relative importance of major areas or modules within the context of the entire evaluation. Weights are assignable at the discretion of the user.

Score - is a measure of how well a given criteria is met by a particular alternative. It is suggested that scores be assigned on a simple 0 - 10 scale (or user defined equivalent). Only those items which have weighting factors should be scored.

Weighted Score - this column entry is the product of the weight and the score and is a measure of how well the needs of a user are met on that particular item, area or module.

Maximum Weighted Score - is the product of the weight and the maximum possible score. This would be the weighted score which implies a perfect fit to the needs of the user on a particular criteria item, set thereof, factor, etc.

Weighted Score/Max Weighted Score - this ratio gives a proportional measure of how well user needs are met on a particular item, set thereof, factor, etc.

For those evaluators who may wish to compare raw and weighted scores across product alternatives, A Detailed Scoring Comparison Form was also developed (see Appendix 3). This particular form is identical in format to the Detailed Evaluation Criteria Form but contains only those items which were scoreable (ie. it does not include context related items).

2.2 Evaluation Method

All evaluations were conducted in a school using real and full school data. Wherever possible, live or current school data was used. When this was not possible, data associated with a known reference point was used. While the actual testing was performed by programmer or systems analysts, school administrators were fully involved with the key decisions and judgements which guided the evaluations generally. This was one of the most important reasons why the evaluations were conducted in the schools. All key system capabilities were tested particularly as they related to:

- Data base creation and maintenance
- Pre-scheduling
- Scheduling
- Transition to operational status (and semester turnover)
- Attendance recording and reporting
- Progress recording and reporting
- Report generation
- Utility functions

It is not possible to list all evaluation considerations for all criteria in this report - some key performance considerations, however, were the quality of results achieved, completion times for major procedures and reports and inquiry response times.

During the course of the evaluations, each system was scored against each of the evaluation critiera using a zero to ten point scale. Scores were assigned as overall measures of "performance" against the criteria taking into account all considerations believed to be relevant by the evaluation team.

For example, consider the scheduling process. Both the timing and the quality of the result are critical evaluation considerations. Competitive systems might receive equivalently low scores if, while one produces a high quality result (e.g. high % students completely scheduled) in a very long timeframe, the other produces a low quality result in a very short timeframe.

In isolation, the mere presence of a particular feature or the sheer speed with which a process could be completed or the high quality of a particular result were not necessarily consistent with the awarding of high scores.

Testing and evaluation was supervised by two different project leaders on the Distributed Systems Team (of Edmonton Public Schools' Information Services). Every attempt was made to maximize objectivity.

Frequent meetings were held to ensure cross referencing and the sharing of ideas and experiences. Despite this, of course, it is reasonable to expect some subjectivity to exist characteristic of the particular evaluator.

3.0 OVERVIEW OF SYSTEMS EVALUATED

3.1 The PASS Centred System

The software provided by Mid-American falls into two quite different categories each of which should be discussed separately.

1) PROMPT is a data base management and programming tool which is used in much of Mid-American software as the development language. PROMPT was also used as the base for locally developed programs.

2) The Student Information and Scheduling module known as PASS, standing for PROMPT Automated Student Scheduling, is the second component purchased from Mid-American. PASS was primarily developed using PROMPT and as such is easily interfaced to other PROMPT-based software.

Steps in the evaluation and development included:

- analysis of the scheduler characteristics and the initiation of essential customizations.

- initial testing with "clean" data for which results were known.

- development of a Pupil Records database to replace the minimal one included with PASS. The design of this database was focussed on EPSB type data structures.

Initial testing proved largely positive and led to the development of a period by period attendance system which was integrated with the pupil records and student scheduling components. The attendance system was initially tested under operating conditions in January 1984. Some minor modifications were effected and the system went into in full use in February 1984. This included the pupil records maintenance of demographic data transfers in and out and changes in students timetables. These items were necessary to maintain since this file is the basis for the attendance system. Changes which were made to the Series 1 data base at Jasper Place were captured and transmitted to the mainframe for updating there. It is important to stress that not all school districts would have a requirement to update a "mainframe"computer but telecommunications would still be required between central office and schools.

Scheduling for the 1984/85 year was done using the Mid-American PASS system along with the locally developed database updating procedures. Initially, parallel runs were done on both mainframe and minicomputer but as results were verified and shown to be consistent, the minicomputer became the active scheduling system. The various reports used for school opening were generated by the minicomputer system. These included student and teacher timetables, class lists, school directories and ID cards.

Student timetables were transmitted to the mainframe for updating the district data base. The files were ready for attendance input on the first day of school and the scheduler was kept open in order to schedule late registrants. This minicomputer system is currently in use at Jasper Place and is the primary system for attendance and student timetables generation. Progress reporting is still done on the mainframe with attendance data and timetable changes transmitted to the control site.

3.2 SAS

The SIERRA Software Systems Student Administration System (SAS) package was developed on a Digital Equipment VAX 11/750 minicomputer (a fairly large and powerful computer) as a centralized timesharing system for use by a number of schools. Two demonstrations of the SAS package were attended by Distributed Systems Team members and based on investigations and these demonstrations a VAX 11/725 computer (a very much smaller machine) and the SAS package were purchased. The system was installed at Jasper Place Composite High School in October 1984 after approximately one week of system software and configuration work. After a short "hands-on" learning phase, a formal 2 day training course was provided by SIERRA (October 29th and 30th, 1984).

The software provided by SIERRA incorporates all of the main features required in a School Information Management System: Student records, scheduling, attendance and progress/marks. It was therefore decided that the main thrust of the evaluation would be to test the system with a full set of school data; develop data transfer software to automatically load the database from other computers (mainframe, mini-and micro-) and develop reports using the report writer package provided. The testing plan outlined three main phases of work:

Phase I: Configure the VMS Operating System and SAS package, set up all static data, set up 168 Grade 1K (pre-Grade 10) students and schedule them.

Phase II: Develop software to download all 1846 student records and 15,000 course requests from the district mainframe computers. Edit records as necessary, build a full master schedule.

Phase III: Obtain the best possible schedule for all students, produce all necessary reports (e.g. timetables), load students into classes, design and develop reports as necessary, test attendance and progress functions.

All three phases were completed as planned, the only exception being that mainframe downloading was carried out via an IBM PC computer rather than directly from mainframe to VAX.

The work was completed in February 1985.

SIERRA[1] is based in Vancouver and provides centralized time-sharing as well as distributed system services. A number of school districts in British Columbia use the SAS package and there is a fairly wide user base in the Northwest United States.

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[1] SIERRA is now part of a larger group of companies called Computech Limited.

4.0 PRODUCT EVALUATIONS - SENIOR HIGH SCHOOL PERSPECTIVE

As stated previously, the PASS and PROMPT systems were evaluated at a senior high school on an IBM Series 1 minicomputer. The following subsections describe the product, development tools, software developed by Edmonton Public Schools, the testing environment and results of evaluation.

4.1 Evaluation of the PASS Centred System

4.1.1 Product Description

PASS

The PASS system or PROMPT Automated Student Scheduling is a system written in PROMPT language with some of the more time consuming (CPU bound) work like scheduling students and conflict analyses subprograms written in an assembler like language, EDL, which executes more rapidly.

The system is composed of 3 main parts which parallel the chronological steps in preparing a school for start of the year operation.

Part I

Part I is primarily concerned with getting student information into the system along with course selections. This is provided by input of a course catalogue or course offering file, a list of directions against which student requests are validated. The student demographic information is minimal including little more than name, address, phone, birthdate, sex, grade and a few other fields. This is basically just the information which would be required for scheduling a student and corresponding with the student and or parents. Certain reports such as "course request tallies", are necessary for building a master schedule and "potential conflicts" and "preliminary rosters" are produced in this phase along with reports used to edit and clean up the student and course request files.

Part II

Part II includes the data entry of files and procedures necessary in establishing the school master schedule. Master schedule entry is facilitated here and editing of valid courses, valid teachers, and sequential sections of courses is done at data entry time. Once the master has been entered then two special reports can be generated showing instructor conflicts and room conflicts. Any modifications based on these reports can be made and a hard copy of the master schedule generated.

Part III

This is where the actual scheduling of students is initiated. The scheduling procedure is designed so that a number of runs can be done using various conditions such as specific grades only, overfill classes or not, and allow partial schedules or not. Each time the scheduler is run those students not scheduled are picked out and a timetable is attempted to be found for each. The option also exists to clear out all timetables, set counts in each class to zero, and start again from scratch. Each scheduling run provides automatic statistics as to how many students were scheduled and how many were not. After a scheduling run, various reports may be generated, some of which are student timetables for the last group scheduled or for all students or for students with conflicts and master schedule tallies to see how classes filled up. The option also exists to get a report of students with free time and to use study hall generation as a way to deal with the free time issue.

Hard scheduling of students and/or changing classes assigned to a student may be done at any time. The final part of this phase is the generation of student schedules, teacher schedules and class lists.

A number of modifications to this package were made in order to better reflect the data and operational environments at Jasper Place in particular and Edmonton Public Schools in general. These changes were possible since most of PASS is written in PROMPT allowing the team to modify software as we have both the tools and expertise.

Conflict Report

The conflict report as delivered contained a large amount of unnecessary information (lists of pairs of courses with no conflicts) and a format where the really important information was difficult to extract. Changes were made to allow conflict reports on "singletons" only and "singletons" and "doubletons" together. All zero's were excluded from the report and the remaining non zero entries were ranked from highest to lowest number. These changes resulted in a more compact and easier to read report.

School Reports

The reports for school scheduling were significantly changed. Student timetables were produced on EPSB preprinted forms in both grid and tabular form. Teacher timetables were produced in grid form for each semester and class lists were produced on EPSB customized forms.

Pupil Records Database

The pupil records area was altered in a different way. A new data base was created separately from the one included in PASS. This data base reflected the needs and coding conventions currently used within the district. Programs were then written to interface between this newly developed pupil records database and the pupil records required for input to the scheduler. The output of the scheduler was again converted into a format which was determined in the new data base. More information on this development is included in the next section of this report.

PROMPT

PROMPT is a data base management tool which allows the user a great deal of flexibility in the design, programming, and implementation of an application.

File Creation

Specification of a File Control Block or FCB allows for the definition of a file structure and formatting of a data entry screen if desired. The characteristics of the file are stored and many files with these charactertics may be created.

File conversion specifications may be used to convert files of one format to another. This is very useful if a FCB needs to be changed as all data under the old FCB can be converted to the new.

File amend specifications may be written to amend the contents on any file. Each amend specification can specify which fields may be changed or not changed or displayed only. Multiple amends can be written for any one file with varying degress of changes allowed, that is one person could amend certain fields whereas another could amend different fields.

File inquiries and reports may be written to display certain fields of a number of files in a programmer defined format. Each report and inquiry is stored and may be used with a number of different files.

The existence of "processors" allows the programmer to write specific programs to enable processing which is not covered in the PROMPT facilities. This allows some very customized processing and gives a large amount of flexibility to the programmer.

The true power of PROMPT is found in the menu creation facility. Here most of the items on the data base facilities screen and other programs can be embedded in a menu and activated by that menu. The operator at a screen sees only the menu selections and the programmer has total control of the job-streams defined by the menu.

The management system also includes a number of other standard data processing tools such as sorts, merges, extracts, copy, etc.

PROMPT has now been used for over a year and a half at this site and has shown to be very reliable and error free. Enhancements are being added to PROMPT along with a number of special supplementary tools which will overcome some of the recognized, current limitations. Mid-American is also undertaking a major rewrite of PROMPT where the file structures will be based on relational database concepts.

Distributed Systems Team Developed Software

Database Development

In order to test and implement the scheduling component of Mid-American software, it was necessary to design a pupil records database which would allow for data to be received from and sent to the mainframe and to allow for passing data through conversion processes to the scheduler and bringing scheduling results back. This local database was developed after a careful analysis of the scheduler (PASS) requirements, the school operational requirements and the mainframe requirements and restrictions. The major files are a student demographic file which is keyed on a six character local school defined student ID which is cross referenced to the mainframe student ID and the scheduling ID. The fields were defined to handle the attributes of the data currently considered important and with expansion space if the need arises. There is one record for each student. The second major file contains the student timetable information with areas reserved for attendance and progress. This is a multiple record type of file with one record for each course or class a student is taking. The class and section number identify the class and link to the master scheduler file where information on course titles, periods, semesters, rooms, teachers, credits etc. are kept.

In close conjunction with these files is a system of maintaining each file and producing edit type reports and/or screen messages which reflect the file changes. Areas of development included adding or deleting students from the file (deletions actually go to another area for storage since a student may return), changing any of the demographic data, changing timetables, and capturing many of these changes for transmission to the mainframe. Also a number of different inquiries have been developed to allow for screen lookups of student timetable attendance information or demographic information. A number of reports have been designed to reflect the school requirements; among these are school directories, class lists, master schedule list and various cross reference reports.

Attendance System

An attendance system using PROMPT has been designed, programmed, and implemented by Distributed Systems Team staff. Major design criteria were:

- period by period attendance capturing
- minimal data entry
- user defined reason codes
- timely generation of daily attendance exceptions (excused, unexcused)
- two week attendance summary for every student and every class.

The attendance system is in current operation and has been so for over 1 year. Student and class information is totally integrated so that at any point in time attendance information is posted into the proper record.

Typical daily operation would begin with amending any entries from previous days which were incorrectly updated. Entry of current day absences as reported by teachers, preferably in batches by period. This process is intermixed with excused absence entry throughout the day due to parent phone calls, student reporting or school activities such as field trips. Any excused absence codes are held and logically matched to reported absences from class. The end of the day procedures generate a report showing excused absences by students with excuse code for each period, a report of students with any unexcused absences for any period and a list for school distribution arranged alphabetically of all students with unexcused absences.

Detailed attendance information is kept for 2 weeks, then is summarized for each student for each class and a master report for the whole school is produced. Attendance information which is required for progress reporting is transmitted to the mainframe.

The success of the testing and implementation of the attendance system have resulted in the school discontinuing use of the mainframe based attendance system. Single transaction capturing at the current time has replaced the old system, and streamlined and made more efficient the capturing and reporting of attendance data.

Communications Systems

The need for information to be consistent with the mainframe in a timely way has brought to the fore a need for some means of communication between the central mainframe and the school based minicomputer system.

The data base design and updating procedures design were undertaken with this requirement in mind. The actual communication software chosen was a Remote Job Entry (RJE) program running on the Series 1 and a matching program on the mainframe. To facilitate a two way communication custom programs were written in COBOL on the mainframe and in PROMPT at the minicomputer end. These programs allowed for extracts from the mainframe followed by logical updates at the minicomputer end and extracts of transactions from the minicomputer end sent into the regular mainframe update jobstream. Student demographic data and course requests were transmitted from the mainframe to the minicomputer and timetable changes and attendance data were transmitted from the minicomputer to the mainframe.

Because of a decision to schedule Jasper Place on the mainframe and on the minicomputer, programs were developed to transmit, through conversion jobstreams, the master schedule in both directions. This allowed changes in the master schedule made at either machine to be reflected in the other. A side product of this process was the ability to get a very clean master schedule as so many checks were made in the conversions that almost any anomaly was quickly detected and corrected.

4.1.2 Testing Environment and Conditions

The hardware environment for testing and eventual implementation included the Series 1 with 384K core divided into 6 partitions, a 63 megabyte hard disk drive, 1 floppy diskette drive, 1 Bisync communications card with appropriate modem, three 3101 terminals, one IBM PC with terminal emulation software, and one 4974 200 cps printer. See Appendix 4, page 2 for the physical configuration.

One terminal located in the main office was used solely for attendance system purposes. The console terminal described as the centre for pupil records updating and large report printing and the two remaining terminals were used primarily for programming and system monitoring.

Experience showed that careful planning of job submissions was necessary. If two terminals simultaneously initiated tasks which were heavy in processing (CPU bound) then response time on any terminal became unacceptable. However, four terminals could all be functional if each was engaged in inquiries, or data entry, or report writing, or other non intensive routines.

Data entry of attendance information is made at one point only and then sent to other areas where required. This includes mainframe uploading. Student timetable changes are also entered only once with transactions captured and transmitted to the mainframe for update there. However, certain data has had to be double-entered, this includes information such as registering new students and deletion of students.

Printing of reports has been a problem especially for long reports where multiple copies are required. A prime example of this is the two week attendance report which shows every student and their attendance record in every class. The report is 275 pages long and takes about 5 hours to print which means in total 20-25 hours printing. Over night printing has been only partially successful as many times, paper jams seem to occur and printing during the day tends to hold up other necessary jobs.

The scheduling testing and implementation has spanned 2 scheduling years 1983/84 and 1984/85. During the 1983/84 year the mainframe scheduling was the primary operation with the minicomputer playing a tracking role. Errors were found in some of the schedules produced by Mid-American and a decision was made to use the mainframe results. During the 1984/85 scheduling procedure the minicomputer became the primary system with the mainframe in a backup role. Confidence grew in the Mid-American schedules and the number of parallel runs decreased. Jasper Place opened using the minicomputer schedules and these timetables were tranmitted to the mainframe in early September.

4.1.3 Evaluation Results and Observations

The following tables show the quantitative evaluation of the PASS centred system against the detailed criteria.

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT SCOPE & FUNCTION	**SCHOOL RECORDS**					
	Pre-Registration/Enrollment					
	Create student record	15	9	135		
	- school student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address					
	Registration confirmation notice	3	1	3		
	Feeder school confirmation notice	2	3	6		
	TOTAL Pre-Registration/Enrollment	20	13/30	144	200	.72
	Detailed Data Items					
	Student information	25	8	200		
	- school student I.D. - District student I.D. - Alberta Education student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address - telephone number					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- emergency contact - name - telephone - entry information - entry date - registration code - withdrawal code - previous schools (2) - homeroom instruction - counsellor - parent/guardian information (up to 4) - name - address - telephone (home and business) - relationship - occupation - locker information - number - combination - student indebtedness - religious denomination - program type - number of credits earned - this school - other schools - academic history - travel information - method - distance - bus pass information - parking information - driver's licence - licence plate - parking space - medical information - disabilities/behaviours - medications - allergies					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- date of last medical - physician information - health care number - departure information - date - reason - minimum of 6 user defined fields					
	Instructor Information	5	3	15		
	- instructor code - name - address - telephone - social insurance number - language of instruction - certificate number - courses taught - minimum of 6 user defined fields					
	Course information	15	6	90		
	- course code (5 character alpha-numeric) - description - pre-and co-requisites (minimum of 4) - must handle"and"/"or"situation - course type - language of instruction - course accreditation - credit value (2 digits) - pass/fail mark - grade					
	TOTAL Detailed Data Items	45	17/30	305	450	.677

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	25	8	200		
	All reports and inquiries should be available for all or a specified range of records, in various sort orders. - class lists - homeroom lists - student name labels - student address labels - parent address labels - student I.D. cards - student data (alphabetical or numerical order) - parent data (alphabetical or numerical order) - instructor data (alphabetical or numerical order) - course data - student phone list - student name list - student grade list - feeder school list - locker information list - student population by instruction type - fee sheets					
	The system should allow production of user-defined reports/inquiries using available data.					
	TOTAL Reports/Inquiries	25	8	200	250	.8
	TOTAL SCHOOL RECORDS	90	38/70	649	900	.72

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	SCHEDULING					
	Detailed Data Items					
	- Course code - Course section					
	Manual scheduling (Arena Scheduling)	7	7	49		
	Pre-scheduling					
	Course Requests					
	manual entry	5	8	40		
	automated entry	9	3	27		
	- allow student to specify mandatory/ compulsory courses, - preferred courses, preferred alternatives, etc. - allow student to specify preferred section, semester, or instructor					
	Edit and validation of course requests	7	4	28		
	- checking of pre- and co-requisites in the current students' requests as well as history files - capability to override pre- and co-requisites - capability to complete pre-requisite checking for students from other District schools.					
	Pre-scheduling reports	9	7	63		
	- potential conflict matrix — for all or a specified range of courses. Additional selection criteria may be					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	based on the number of requests or the number of sections.					
	- course tally					
	- students with no requests					
	- student course request list					
	- min/max request list					
	- min/max credit list					
	- verification tickets					
	- arena scheduling labels					
	- students missing compulsory courses					
	- students requesting specific course or group of courses					
	Master schedule builder					
	Capability to build a master schedule					
	manually	6	7	42		
	automatically	9	0	0		
	Capability of handling a variety of Scheduling units	9	3	27		
	- full year					
	- semester					
	- trimester					
	- quartermester					
	- 6 week unit					
	- any combination of the above					
	User defined timetable rotation/tumble	10	3	30		
	Flexible number of periods per day	10	8	80		
	Capability to specify exclusive male or female sections	5	8	40		
	Capability to maintain current and future year/semester master schedules	8	8	64		

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Scheduling Process					
	User defined scheduling sequence - low grades first - high grades first - A to Z - Z to A	6	9	54		
	Unscheduling of no-shows/withdrawals	5	9	45		
	Scheduling of individual student or small groups of students	6	6	36		
	Capability to reset all students or partially scheduled students	8	0	0		
	Capability to lock scheduling assignments for all students or a group of students	8	2	16		
	Restart capability	8	0	0		
	Course weighting/semester balancing (ensure even course load for students)	8	8	64		
	Blocking of courses	7	4	28		
	Section balancing	8	8	64		
	Class balancing (males-females)	4	8	32		
	Capability to keep scheduling open after school start while starting to use the attendance module	9	4	36		
	Scheduling Reports/Inquiries	10	8	80		
	- student timetables — grid and list format - instructor timetables — grid and list format - room timetables — grid and list format - master schedule - student scheduling conflicts - students partially scheduled - unassigned time					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Junior High Scheduling Requirements					
	Homeroom grouping for core subjects					
	Capability of scheduling any course in any combination and number of time periods					
	TOTAL SCHEDULING	181	126/240	945	1810	.52
	STUDENT ATTENDANCE					
	Entry of Attendance Data					
	manual entry	5	8	40		
	automated entry	9	0	0		
	Multiple user-defined absence types	8	8	64		
	Capability to record attendance data at various intervals	10	8	80		
	- daily - twice per day - period by period - subject by subject					
	Attendance history	8	8	64		
	- at least ten days detail - cummulative totals					
	Attendance reports/inquiries	10	8	80		
	- student by class - student by subject - student by period					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- homeroom attendance					
	- daily summary					
	- weekly summary					
	- monthly summary					
	- multiple absence					
	- capability to produce unexcused absence report for the current day within 30 minutes					
	- the system should allow user defined reports/inquiries using available data					
	TOTAL ATTENDANCE	50	40/60	328	500	.656
	STUDENT MARKS					
	Entry of marks data					
	manual	5	0	0		
	automated	9	0	0		
	Marks data	10	0	0		
	- minimum of 4 term marks plus final mark					
	- letter or percentage grades					
	Student Exams	6	0	0		
	Exam timetable builder					
	- automated					
	- manual					
	Exam Reports/Inquiries					
	- potential exam conflict matrix					
	- exam schedules					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	10	0	0		
	proof list report cards - marks data - final mark, calculated according to user-defined formula attenandance data - class averages - honour lists - potential failure lists - graduation list					
	TOTAL STUDENT MARKS	40	0/50	0	400	0
	UTILITY FUNCTIONS					
	Backup/Restore	12	6	72		
	Security/Controls	8	2	16		
	TOTAL UTILITY FUNCTIONS	20	8/20	88	200	.44
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	381	212/440	2010	3810	.5276
EASE OF USE	- flexibility - modular, table driven - help facilities - menu driven	60	5	300		
	GRAND TOTAL, EASE OF USE	60	5	300	600	.5

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE

TECHNICAL CONSIDERATIONS	- hardware
	- system software environment
	  - operating system
	  - utilities
	  - database management/system internals/files
	  - networking capabilities
	  - user hooks
	  - modularity of the system
		80	4	320		

	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80	4	320	800	.4

SUPPORT & SERVICES	- local versus where/how far
	- package support and services
	  - software support, custom modifications
	- documentation
	  - user guide, application system, procedural, operations guide, file layouts
	- training
	  - applications system, operational (DP), availability schedule, format, location, prerequisites
	- implementation
	  - training
	  - initialization (conversion,file set-up, output forms)
	  - implementation plan
		70	5	350		

	GRAND TOTAL, SUPPORT & SERVICES	70	5	350	700	.5

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT QUALIFICATIONS		80	7	560		
	- package background - reliability - current development status - number of installations - product development plans - release concept, portability, verticality					
	GRAND TOTAL, PRODUCT QUALIFICATIONS	80	7	560	800	.7
VENDOR		70	8	560		
	- Corporate information - background and history - financial performance - employee base - Market volatility and vendor stability - References - Contractual Terms - maintenance - warranty - ownership rights - discount structure/price limit					
	GRAND TOTAL, VENDOR	70	8	560	700	.8

Observations

For each of the six major evaluation factors, the following comments and observations are offered in support of the quantitative evaluation of the PASS centred system.

(A) Product Scope and Function

The Mid-American package is not well suited to be rated based on the criteria items since this is primarily a development system and developed within our environment. This means that the areas such as student demographic information and reporting would rank highly whilst areas such as progress reporting will not rank at all since these have not been developed. However, an attempt has been made to complete the rating forms in accordance with fully developed packages.

Generally the Detailed Student Data will rank quite high since the database was designed with most of these data elements in mind. Also since PROMPT is used the data base is very easily expandable to include any of the other pieces of data which were deemed necessary. Instructor information is minimal at present and designed only for scheduling purposes. Again this could be easily expanded. Course information is generally acceptable except for lack of any pre-requisite and/or co-requisite capabilities. Approximately 60% of the listed reports are present, however, since using PROMPT any custom report could be generated.

The scheduling module handled all situations which the mainframe could and generated some extra useful reports such as teacher timetables, and teacher/room conflicts and had the capability to schedule small groups of students over those already scheduled. A number of extra features were not present or did not perform well. These included inability to deal with combinations of quartermester and trimester mixes, inability to handle very scattered course meeting times, difficulty in linking courses during scheduling, and inability to handle pre-requisite situations.

The student attendance system rated highly as it was designed to meet the needs of schools within our district. The main negative area was the lack of automated data input.

The student marks function is rated zero since no development has been done in this area.

(B) Ease of Use

The use of PROMPT as a development tool has allowed a great deal of flexibility at both the programming level and at the user level. The user or operator sees only application menus which can be defined and maintained using PROMPT. Menus can call other menus thus a hierarchial structure may be developed.

(C) Technical Considerations

The Series I and primary operating system EDX are not reknown for user friendliness. A certain amount of programmer or operator level support is required to keep the system in prime running order. PROMPT deals primarily with Indexed Sequential Files which tends to make jobsteams run slowly due to the constant need for sorting and indexing. As jobs are processing the screen constantly displays a sequence of job control language type statements which are meaningless to the normal user.

(D) Support and Services

With Mid-American situated in the mid eastern part of the United States the distance is at times a problem as well as the inconvience of dealing across country borders. Several times exchange of software, data and information has been delayed due to customs requirements.

Mid-American has been very conscious and receptive to problems due to software errors and has sent patches and updates as rapidly as possible. They also maintain a support system by phone and are usually quite rapid in solving problems. Training sessions are held periodically for various levels of PROMPT training. Support for the IBM Series 1 has been weak since there seems to be no local Series 1 expert. Both the Series 1 and Mid-American programs have quite extensive documentation.

(E) Product Qualifications

PROMPT has been available since 1976 and soon version 10 will be released which will show several major enhancements. The PASS system has been expanded to include grade reporting and attendance modules.

PROMPT has been a very reliable product with no evidence of system bugs. The PASS system has had some operational problems due to software errors, however these have been resolved.

(F) Vendor

Mid-American Control Corporation is the developer of PROMPT and PASS along with a number of other application software packages including financial and inventory systems. The company has an employee base of 30 or more people and is currently expanding its physical premises in order to meet the needs of expanded growth.

Student Administration systems are being continually monitored and enhanced. Currently, a major programming activity is the evolution of PROMPT from an indexed sequential file based system to a true relational data base system.

The company also has a number of dealers scattered throughout the USA, Canada, and Europe who sell and provide initial support for their software packages.

4.1.4 System Performance, Strengths and Weaknesses - PASS Centred System

Key Performance Indicators

School Test Site	Parameter	Result
Jasper Place CHS	Scheduler - Time	8:30 hours
	Scheduler - Performance	85%
	Scheduler - Expected Perf.	85%
	Timetables	23:00 hours (grid)
	Conflict Matrix	5:30 hours
	Course Tally	-
	Master Schedule	0:50 hours
	Class Lists	7:00 hours
	Attendance Registers	
	Student Registers	1:15 hours
	Jasper Place CHS	1846 students

(All timings are in hours:minutes)

System Strengths:

1. Totally user defined in terms of fields and files and reports (Thus system is user alterable).

2. Scheduler loaded classes very well and made partial schedules by leaving out the least significant courses e.g. compulsory or core courses are placed before options.

3. Transaction capturing in place for certain types of transactions such as student progress records. This means that updating the mainframe file is through changes rather than overwriting the whole file.

4. System is multiuser.

5. Scheduling with partial schedules prints the appropriate courses from master schedule to enable the administrators to manually resolve the conflict.

6. Communication with the mainframe is established though a fair amount of polishing is required to make it customer usable.

7. Prints on various forms which have proven useful over many years (flexible report writing).

8. The attendance system has some intelligence, rather than strictly capturing data. It can handle special requirements such as unreported absences and field trips.

System Weaknesses:

1. System requires a fair amount of programmer type support in its present state and would always require a small amount.

2. Inefficient use of hardware. i.e. several processes running at the same time really impact the system, response time becomes unreasonable.

3. Student Records System not fully developed at present. Progress Reporting is absent and other systems would require refining.

4. High hardware and software costs.

5. Little user type documentation currently written. Refining type changes would need to be completed before a serious effort in documentation was initiated.

6. No history segment within data base. For optimal use a pre-requisite checking system would need to be developed at the same time.

4.2 EVALUATION OF SAS - SENIOR HIGH SCHOOL PERSPECTIVE

The following sub-sections illustrate the details of the product, Distributed Systems team developed components, the environment in which testing took place, detailed evaluation tables and related results.

4.2.1 Product Description

SAS

The Student Administration System is a fairly large, modular package of programs. It is written almost entirely in VAX Basic and is compiled for speed and efficiency. There is a very small amount of assembler code and a few hundred lines of job control language (called DCL - Digital Command Language). The package works with the standard VAX database system - RMS - but does not utilize the file layout or utilities within RMS. Thus, to the RMS database management system each file record consists of 2 fields - key and "Filler".

The Student Administration System consists of several components which can be used by the school(s):

- School Initialisation
- Student Records
- Scheduling
- Division Assignments
- Marks Administration
- Attendance Checking
- Year End Reporting and Maintenance
- Government Reporting
- Miscellaneous Reporting

The components can all be operated from the same terminal located in a school office.

At the school, the user interacts with the application system using one or more terminals. One or more printers are used to produce reports and labels. The printer and terminal can be connected locally, or, where a number of schools share one VAX minicomputer, via a modem to the central computer site.

The application system is modular and interactive using a series of heirarchical menus and active editing and validation of data as it is entered (field by field editing). A number of BASIC run-time library messages were displayed due to program crashes or user errors but in general, the system is user friendly with some on-line help and considerable flexibility in terms of "routes" to a particular function. Report requests generate spooled reports which have to be released from the system spooler by a series of VAX/VMS commands; this was considered to be overly complex and would require application users to learn a fair amount about the VAX/VMS operating systems.

In addition to the application system, the part the user sees, there are a number of components available for the system and application programmer. ADE is the Application Design Environment and is a set of development tools which help the application programmer develop reports (it includes a sophisticated report writer package). There are programs for interfacing with other computer systems and data management programs. The System Manager Software provided facilities for managing the database, the interface with the Operating System, overall priorities of applications, timing parameters, batch and printer queues and system tables. The generation software is a series of job control files used to set up the application system and database files and initialize the school parameters.

User documentation is very comprehensive and structured; it comes in a plastic binder with a Central Users Guide (System Managers Guide) provided in a separate binder. The user manual provides an overview of the application system followed by a series of diagrams showing the operational cycle and detailed sections on each function. The Central Users Guide lists the various "hidden" screens available to the system manager for controlling batch queues and resources and setting record pointers and other internal parameters.

Distributed Systems Team Developed Software

The purchased software, while providing all of the main Student Information facilities was found to be deficient in two areas: data loading from external sources and reports. Software was developed by the Distributed Systems Team in these two areas as part of the evaluation study. This work mirrored similar developments in the evaluation of the PASS centred system.

Data Loading and Transfer

Student demographic data and course requests were derived from IBM Series 1 and 4341 computers. It was decided to automate the transfer of data because of the large volume of information involved and the need to eliminate punching and other manual errors. An IBM PC microcomputer was connected by a serial line to the IBM Series 1 minicomputer and used to extract data and merge it from 3 record types to produce student demographic records. Similarly, course request records were extracted from the Series 1 computer and modified on the IBM PC. Data was then loaded from a DEC Rainbow (IBM PC software compatible) microcomputer to the VAX minicomputer where it was reorganized into RMS database records. Appendix 5 lists the processes involved in detail.

Reports

A number of key reports were found to be either absent (not listed as menu options or "unavailable" when requested) or failed to work. The most critical area where this problem occurred was in the setting up of the static and control parameters. At this stage, instant feedback is needed in the form of directory or edit listings of, for example, rooms, teachers, absence codes and program codes. At a later stage in the evaluation process, detailed reports were needed from the course and class master files.

In both cases a number of reports were developed using the report writer package provided by SIERRA. Although rudimentary (it only works with a single data base file) and fairly complex, the package was found to be ideal for obtaining full single file reports. A more sophisticated report writer is under development. This is not intended to be a programmer's development utility.

4.2.2 Testing Environment and Conditions

Testing of the SAS package was carried out at Jasper Place Composite High School between October 1984 and February 1985. The testing environment was a 2 megabyte VAX 11/725 minicomputer with twin (one fixed and one cartridge/removeable) 25 megabyte disc drives, twin cartridge tape units, two DEC Rainbow 100 microcomputers connected as terminals (one equipped with a local LA50 printer), an LA100 300 cps printer and a VT220 system terminal. Initial setup, intialization of database files and creation of static parameters, pre-grade 10 students and course requests was done by manual data entry. Full testing of all students and course requests was accomplished with data loading via the Rainbow 100 computers using a file transfer package called POLY XFR.

All VAX applications, including the SAS package, spooler, batch "day" and "night" processing queues and the RMS database system ran under the VAX/VMS operating system which was specially configured for the VAX 11/725 by a team composed of members of SIERRA Limited, Digital Equipment of Canada and the Edmonton Public Schools District.

All reports were printed through the system spooler on 3 printer queues. Large reports were printed at night using a low priority printer queue. Similarly, scheduling and calculation batch processes were run in a low priority "night" batch queue with minimal degradation to online, interactive work (editing of scheduling data was correctly locked out).

At all times, the computer system performed well and provided good virtual machine, multi-user facilities. Backups of all database files were made at bi-weekly intervals.

4.2.3 Evaluation Results and Observations

The following tables indicate the results of testing the SAS package against the detailed evaluation criteria. The planned developments of the package were not allowed for in the scores.

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT SCOPE & FUNCTION	**SCHOOL RECORDS**					
	Pre-Registration/Enrollment					
	Create student record	15	10	150		
	- school student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address					
	Registration confirmation notice	3	0	0		
	Feeder school confirmation notice	2	0	0		
	TOTAL Pre-Registration/Enrollment	**20**	**10/30**	**150**	**200**	**.75**
	Detailed Data Items					
	Student information	25	8	200		
	- school student I.D. - District student I.D. - Alberta Education student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address - telephone number					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE

	- emergency contact
	    - name
	    - telephone
	- entry information
	    - entry date
	    - registration code
	    - withdrawal code
	- previous schools (2)
	- homeroom instruction
	- counsellor
	- parent/guardian information (up to 4)
	    - name
	    - address
	    - telephone (home and business)
	    - relationship
	    - occupation
	- locker information
	    - number
	    - combination
	- student indebtedness
	- religious denomination
	- program type
	- number of credits earned
	    - this school
	    - other schools
	- academic history
	- travel information
	    - method
	    - distance
	    - bus pass information
	- parking information
	    - driver's licence
	    - licence plate
	    - parking space
	- medical information
	    - disabilities/behaviours
	    - medications
	    - allergies					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- date of last medical - physician information - health care number - departure information - date - reason - minimum of 6 user defined fields					
	Instructor Information	5	9	45		
	- instructor code - name - address - telephone - social insurance number - language of instruction - certificate number - courses taught - minimum of 6 user defined fields					
	Course information	15	7	105		
	- course code (5 character alpha-numeric) - description - pre-and co-requisites (minimum of 4) - must handle"and"/"or"situation - course type - language of instruction - course accreditation - credit value (2 digits) - pass/fail mark - grade					
	TOTAL Detailed Data Items	45	24/30	350	450	.77

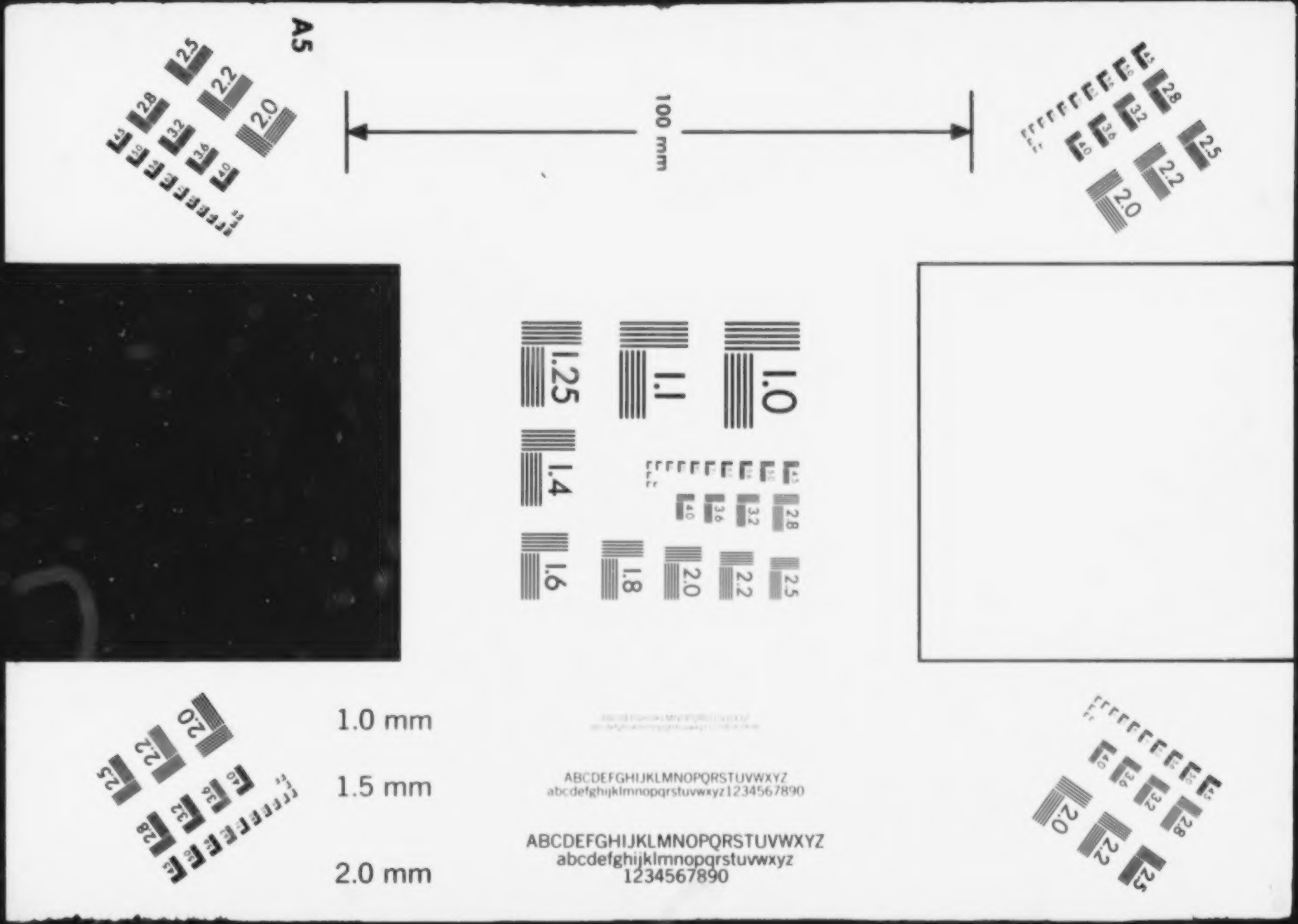
EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	25	9	225		
	All reports and inquiries should be available for all or a specified range of records, in various sort orders. - class lists - homeroom lists - student name labels - student address labels - parent address labels - student I.D. cards - student data (alphabetical or numerical order) - parent data (alphabetical or numerical order) - instructor data (alphabetical or numerical order) - course data - student phone list - student name list - student grade list - feeder school list - locker information list - student population by instruction type - fee sheets The system should allow production of user-defined reports/inquiries using available data.					
	TOTAL Reports/Inquiries	25	9	225	250	.9
	TOTAL SCHOOL RECORDS	90	43/70	725	900	.81

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	SCHEDULING					
	Detailed Data Items					
	- Course code - Course section					
	Manual scheduling (Arena Scheduling)	7	10	70		
	Pre-scheduling					
	Course Requests					
	manual entry	5	10	50		
	automated entry	9	0	0		
	- allow student to specify mandatory/ compulsory courses, - preferred courses, preferred alternatives, etc. - allow student to specify preferred section, semester, or instructor					
	Edit and validation of course requests	7	5	35		
	- checking of pre- and co-requisites in the current students' requests as well as history files - capability to override pre- and co-requisites - capability to complete pre-requisite checking for students from other District schools.					
	Pre-scheduling reports	9	7	63		
	- potential conflict matrix — for all or a specified range of courses. Additional selection criteria may be					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	based on the number of requests or the number of sections.					
	- course tally					
	- students with no requests					
	- student course request list					
	- min/max request list					
	- min/max credit list					
	- verification tickets					
	- arena scheduling labels					
	- students missing compulsory courses					
	- students requesting specific course or group of courses					
	Master schedule builder					
	Capability to build a master schedule					
	manually	6	8	48		
	automatically	9	0	0		
	Capability of handling a variety of Scheduling units	9	6	54		
	- full year					
	- semester					
	- trimester					
	- quartermester					
	- 6 week unit					
	- any combination of the above					
	User defined timetable rotation/tumble	10	5	50		
	Flexible number of periods per day	10	3	30		
	Capability to specify exclusive male or female sections	5	9	45		
	Capability to maintain current and future year/semester master schedules	8	6	48		

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Scheduling Process					
	User defined scheduling sequence	6	9	54		
	- low grades first					
	- high grades first					
	- A to Z					
	- Z to A					
	Unscheduling of no-shows/withdrawals	5	3	15		
	Scheduling of individual student or small groups of students	6	9	54		
	Capability to reset all students or partially scheduled students	8	5	40		
	Capability to lock scheduling assignments for all students or a group of students	8	0	0		
	Restart capability	8	5	40		
	Course weighting/semester balancing (ensure even course load for students)	8	10	80		
	Blocking of courses	7	7	49		
	Section balancing	8	9	72		
	Class balancing (males-females)	4	7	28		
	Capability to keep scheduling open after school start while starting to use the attendance module	9	9	81		
	Scheduling Reports/Inquiries	10	8	80		
	- student timetables — grid and list format					
	- instructor timetables — grid and list format					
	- room timetables — grid and list format					
	- master schedule					
	- student scheduling conflicts					
	- students partially scheduled					
	- unassigned time					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Junior High Scheduling Requirements					
	Homeroom grouping for core subjects	0	0	0		
	Capability of scheduling any course in any combination and number of time periods	0	0	0		
	TOTAL SCHEDULING	181	160	1086	1810	.6
	STUDENT ATTENDANCE					
	Entry of Attendance Data					
	manual entry	5	7	35		
	automated entry	9	0	0		
	Multiple user-defined absence types	8	9	72		
	Capability to record attendance data at various intervals	10	6	60		
	- daily - twice per day - period by period - subject by subject					
	Attendance history	8	7	56		
	- at least ten days detail - cummulative totals					
	Attendance reports/inquiries	10	8	80		
	- student by class - student by subject - student by period					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EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- homeroom attendance - daily summary - weekly summary - monthly summary - multiple absence - capability to produce unexcused absence report for the current day within 30 minutes - the system should allow user defined reports/inquiries using available data					
	TOTAL ATTENDANCE	50	37/60	303	500	.61
	STUDENT MARKS					
	Entry of marks data					
	manual	5	7	35		
	automated	9	0	0		
	Marks data	10	7	70		
	- minimum of 4 term marks plus final mark - letter or percentage grades					
	Student Exams	6	4	24		
	Exam timetable builder					
	- automated - manual					
	Exam Reports/Inquiries					
	- potential exam conflict matrix - exam schedules					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	10	6	60		
	proof list report cards - marks data - final mark, calculated according to user-defined formula attenandance data - class averages - honour lists - potential failure lists - graduation list					
	TOTAL STUDENT MARKS	40	24/50	189	400	.47
	UTILITY FUNCTIONS					
	Backup/Restore	12	5	60		
	Security/Controls	8	8	64		
	TOTAL UTILITY FUNCTIONS	20	13/20	124	200	.62
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	381	267/440	2427	3810	.64
EASE OF USE	- flexibility - modular, table driven - help facilities - menu driven	60	7	420		
	GRAND TOTAL, EASE OF USE	60	7	420	600	.7

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
TECHNICAL CONSIDERATIONS	- hardware - system software environment - operating system - utilities - database management/system internals/files - networking capabilities - user hooks - modularity of the system	80	8	640		
	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80	8	640	800	.8
SUPPORT & SERVICES	- local versus where/how far - package support and services - software support, custom modifications - documentation - user guide, application system, procedural, operations guide, file layouts - training - applications system, operational (DP), availability schedule, format, location, prerequisites - implementation - training - initialization (conversion,file set-up, output forms) - implementation plan	70	7	490		
	GRAND TOTAL, SUPPORT & SERVICES	70	7	490	700	.7

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT QUALIFICATIONS	- package background - reliability - current development status - number of installations - product development plans - release concept, portability, verticality	80	4	320		
	GRAND TOTAL, PRODUCT QUALIFICATIONS	80	4	320	800	.4
VENDOR	- Corporate information - background and history - financial performance - employee base - Market volatility and vendor stability - References - Contractual Terms - maintenance - warranty - ownership rights - discount structure/price limit	70	5	350		
	GRAND TOTAL, VENDOR	70	5	350	700	.5

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Observations

For each of the six major evaluation factors, the following comments and observations are offered in support of the quantitative evaluation of SAS.

(A) Product Scope and Function

School Records:	Comprehensive data fields, validation and edit checking are marred only by the absence of some key data fields and a clumsy, although usable, method of providing user-defined fields. Course information was adequate but lacked essential edit/detail reports.
Scheduling:	The scheduler is powerful, flexible and parameter-driven allowing the user several passes with relaxation of certain requirements (such as class balancing) in the later passes. Editing and validation of course requests was weak and there was a lack of flexibility in the area of definition of rotation/tumble and number of periods per day. When the scheduled classes were loaded we had to "patch" the system tables to go back to the scheduling process.
Attendance and Marks:	These functions were tested in outline, i.e. full production data was not used. Both modules are acceptable with fast data entry of attendance and marks data, fast and accurate reports. Student examination data capture and reporting is very weak and the absence of automated facilities for the capture of attendance data is considered to be a very weak point.
Utility Functions:	Security controls are reasonable and well structured. There are 3 levels of security: System Manager (mainly external to the application package), User Manager, and User. Database backup and restore functions are handled by the Operating System and are adequate but slow. Also, they require the application package to be stopped. Overall, the product is well designed with good interactive screens and messages and provides all of the main school information functions required in a true multi-user environment.

(B) Ease of Use

The system is, in general, user friendly with a "long hand" method of reaching each function and an experienced user's "shorthand" method. The package is reasonably flexible and modular although the job control language files tend to be inflexible in some function areas. The system is largely menu driven with some "hidden" menu items reserved for the User Manager.

On the negative side, there were times when VAX BASIC or VAX/VMS messages were displayed on the screen and programs did occasionally crash, also displaying system messages. Help facilities were at times cryptic and one needed to study the detailed documentation to perform certain functions.

(C) Technical Considerations

The greatest advantage of the VAX computer is the powerful operating system and utility software. VAX/VMS is a true multi-user virtual machine operating system and handles 8 users on the small VAX 11/725 computer. The SAS package benefits from the sophisticated operating system and spooler facilities using multiple parallel tasks to increase throughput. The system is not networked (as a local area network) but this feature is not needed. There are powerful communications facilities available, both synchronous and asynchronous with IBM 3270 protocols, although these facilities were not tested during this project.

The database management system (DBMS), RMS, is a powerful indexed sequential system. Distributed Systems Team used the DBMS extensively for data loading and field by field editing.

The application package provides good user hooks in the job control streams and database files and is modular in design.

(D) Support and Services

Technical and user support was prompt and acceptable. The company is located in Vancouver so that there are weaknesses in the ability to obtain on-site or detailed support. We received some custom modifications and "patches" during the course of the evaluation.

Documentation is very comprehensive and well laid out with a "road map" at the front and step-by-step guides for each of the main processes. The technical guide, called the Central Users Guide, is of poorer quality but does document some of the "hidden" screens.

A training course was provided at the beginning of the study and there was some follow-up from the instructor at roughly monthly intervals. The implementation plan was designed by the Distributed Systems Team and executed with only minor modifications.

(E) Product Qualifications

The SAS package was developed initially as a centralized time-sharing system for school district use. This aspect of the package is still relevant and it could be used for groups of schools. We were unable to obtain references from other production sites, mainly due to the fact that the product is relatively new. The package is, however, in a stable state and shows a high degree of reliability.

Some developments are being made, mostly in the area of system tools for application programmers. Releases are fairly infrequent with only one major upgrade made during the four month evaluation period and none in the five months since.

(F) Vendor

The Vendor is a fairly stable software company based in Vancouver. It is strongly involved in the area of school information software development but seems to be light in the area of production systems.

The contractual terms and warranty of the product are reasonable but still seem to be geared more towards centralized control rather than local school operations.

4.2.4 System Performance, Strengths and Weaknesses - SAS

Key Performance Indicators

School Test Site	Parameter	Result
Jasper Place CHS	Scheduler - Time	6:20 hours
	Scheduler - Performance	90%
	Scheduler - Expected Perf.	95%
	Student Timetables	1:00 hours
	Attendance Register	0:30 hour
	School Directory	1:20 hour
	Marks Register	0:20 hour
	Attendance Reports	2:30 hours
	Class Lists	2:00 hours
	Conflict Matrix	0:22 hour
	Course Request Tally	0:38 hour
	Jasper Place CHS	1846 students

(All timings are in hours:minutes)

System Strengths

Multi-user:	this feature is important for development and production use.
Data transfer from mainframe:	data was loaded from mainframe, Series 1 minicomputer, IBM microcomputer and DEC RAINBOW microcomputer. In all cases, loading and file transfer was straightforward and error-free.
User friendly:	with a couple of exceptions, the screen layouts and method of operation were user friendly.
Good documentation:	very detailed with plenty of examples and guidesheets showing the sequence of operations.

System Weaknesses

Course credits:	The SIERRA package would only allow up to 9.99 credits for a course - some grade 11 and 12 course can earn up to 30 credits.
Scheduler complexity:	the tuning parameters and other data required, such as pass control, were overly complex and difficult in some cases to set up correctly on the first few runs.
School static parameters complexity:	several hundred screens of static data, such as codes for absence, were required. Again, there was too much data complexity and a disproportionate amount of work involved in setting them up.
Reports:	some reports did not work at all, some gave strange or incomplete results, some worked but could not be printed out. The most difficult problem was the absence of some key reports such as listings of the static parameters and key data files. Overall, the reporting subsystem is fairly weak and on a few occasions, the systems analyst had to define and develop reports under the Report Writer program which is not user-friendly.

Specific System Problems

"Students scheduled with free time":	does not produce anything except a BASIC run-time error.
B105 Batch loader:	once this is run to load scheduled students into classes it is very difficult to go back and re-run the Batch Scheduler. We had to patch the database considerably.
R107 Student Schedule:	if this report is run with the "save" option, it is impossible to delete the report file.

5.0 COMPARATIVE EVALUATION OF SIMS - SENIOR HIGH SCHOOL PERSPECTIVE

A detailed comparison was made of the two minicomputer approaches tested at the Senior High School level. The reader is reminded that three microcomputer based products were also tested in similar environments and are the subject of another report.

5.1 Comparison Summary and Review of SIMS Evaluation Data

The following tables show the quantitative evaluation data for the two minicomputer based school information management systems which were evaluated. This data is displayed on the Comparison Summary and Review form which was referred to previously. This form parallels the Detailed Evaluation Criteria forms. The Detailed Scoring Comparison Form differs from the Detailed Criteria forms in that all (non-scorable) context related criteria are omitted and only the weighting factor, raw and weighted scores from the evaluation are displayed. Various levels of totals are shown on the form to facilitate the quick and objective comparison of system performance.

Detailed Scoring Comparison - Senior High Perspective

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SAS SCORE (S)	SAS WEIGHTED SCORE (W X S)	PASS CENTRED SYSTEM SCORE (S)	PASS CENTRED SYSTEM WEIGHTED SCORE (W X S)
PRODUCT SCOPE & FUNCTION	**SCHOOL RECORDS**					
	Pre-Registration/Enrollment					
	Create student record	15	10	150	9	135
	Registration confirmation notice	3	0	0	1	3
	Feeder school confirmation notice	2	0	0	3	6
	TOTAL Pre-Registration/Enrollment	**20**	**10/30**	**150**	**13/30**	**144**
	Detailed Data Items					
	Student information	25	8	200	8	200
	Instructor Information	5	9	45	3	15
	Course information	15	7	105	6	90
	TOTAL Detailed Data Items	**45**	**24/30**	**350**	**7/30**	**305**
	Reports/Inquiries	25	9	225	8	200
	TOTAL Reports/Inquiries	**25**	**9/10**	**225**	**8/10**	**200**
	TOTAL SCHOOL RECORDS	**90**	**43/70**	**725**	**38/70**	**649**
	SCHEDULING					
	Manual scheduling (Arena Scheduling)	7	10	70	7	49

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SAS SCORE (S)	SAS WEIGHTED SCORE (W X S)	PASS CENTRED SYSTEM SCORE (S)	PASS CENTRED SYSTEM WEIGHTED SCORE (W X S)
	Pre-scheduling					
	Course Requests					
	manual entry	5	10	50	8	40
	automated entry	9	0	0	3	27
	Edit and validation of course requests	7	5	35	4	28
	Pre-scheduling reports	9	7	63	7	63
	TOTAL Pre-Scheduling	**30**	**22/40**	**148**	**22/40**	**158**
	Master schedule builder					
	Capability to build a master scheduler					
	manually	6	8	48	7	42
	automatically	9	0	0	0	0
	Capability of handling a variety of scheduling units	9	6	54	3	27
	User defined timetable rotation/tumble	10	5	50	3	30
	Flexible number of periods per day	10	3	30	8	80
	Capability to specify exclusive male or female sections	5	9	45	8	40
	Capability to maintain current and future year/semester master schedules	8	6	48	8	64
	TOTAL Master Schedule Builder	**57**	**37/70**	**275**	**37/70**	**283**
	Scheduling Process					
	User defined scheduling sequence	6	9	54	9	54
	Unscheduling of no-shows/withdrawals	5	3	15	9	45

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SAS		PASS CENTRED SYSTEM	
			SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
	Scheduling of individual student or small groups of students	6	9	54	6	36
	Capability to reset all students or partially scheduled students	8	5	40	0	0
	Capability to lock scheduling assignments for all students or a group of students	8	0	0	2	16
	Restart capability	8	5	40	0	0
	Course weighting/semester balancing (ensure even course load for students)	8	10	80	8	64
	Blocking of courses	7	7	49	4	28
	Section balancing	8	9	72	8	64
	Class balancing (males-females)	4	7	28	8	32
	Capability to keep scheduling open after school start while starting to use the attendance module	9	9	81	4	36
	TOTAL Scheduling Process	77	73/110	513	52/110	375
	Scheduling Reports/Inquiries	10	8	80	8	80
	Junior High Scheduling Requirements					
	Homeroom grouping for core subjects					
	Capability of scheduling any course in any combination and number of time periods					
	TOTAL SCHEDULING	181	150/240	1086	126/240	945
	STUDENT ATTENDANCE					
	Entry of Attendance Data					
	manual entry	5	7	35	8	40
	automated entry	9	0	0	0	0

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SAS SCORE (S)	SAS WEIGHTED SCORE (W X S)	PASS CENTRED SYSTEM SCORE (S)	PASS CENTRED SYSTEM WEIGHTED SCORE (W X S)
	Multiple user-defined absence types	8	9	72	8	64
	Capability to record attendance data at various intervals	10	6	60	8	80
	Attendance history	8	7	56	8	64
	Attendance reports/inquiries	10	8	80	8	80
	TOTAL ATTENDANCE	50	37/60	303	40/60	328
	STUDENT MARKS					
	Entry of marks data					
	manual	5	7	35	0	0
	automated	9	0	0	0	0
	Marks data	10	7	70	0	0
	Student Exams	6	4	24	0	0
	Exam timetable builder					
	Exam Reports/Inquiries					
	Reports/Inquiries	10	6	60		
	TOTAL STUDENT MARKS	40	24/50	189	0/50	0

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SAS SCORE (S)	SAS WEIGHTED SCORE (W X S)	PASS CENTRED SYSTEM SCORE (S)	PASS CENTRED SYSTEM WEIGHTED SCORE (W X S)
	UTILITY FUNCTIONS					
	Backup/Restore	12	5	60	6	72
	Security/Controls	8	8	64	2	16
	TOTAL UTILITY FUNCTIONS	20	13/20	124	8/20	88
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	381	267/440	2427	212/440	2010
EASE OF USE		60	7	420	5	300
	GRAND TOTAL, EASE OF USE	60	7/10	420	5/10	300
TECHNICAL CONSIDERATION		80	8	640	4	320
	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80	8/10	640	4/10	320
SUPPORT & SERVICES		70	7	490	5	350
	GRAND TOTAL, SUPPORT & SERVICES	70	7/10	490	5/10	350

			SAS		PASS CENTRED SYSTEM	
EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
PRODUCT QUALIFICATIONS		80	4	320	7	560
	GRAND TOTAL, PRODUCT QUALIFICATIONS	**80**	**4/10**	**320**	**7/10**	**560**
VENDOR		70	5	350	8	560
	GRAND TOTAL, VENDOR	**70**	**5/10**	**350**	**8/10**	**560**

5.2 Relative Suitability of SIMS to the Senior High Schools

The foregoing results, can now be used to determine the relative suitability of the two approaches to a particular user's needs.

The following describes a method of determining this suitability relative to the six major evaluation factors.

Before determining the overall suitability of a system to the needs of the user, however, the user must first define the relative emphasis that he wishes to place evaluation factors.

The following table shows the emphasis which the evaluation team believes should be placed on the major evaluation factors. The emphases are expressed as percentages and total to 100. While it can be clearly seen that product scope and function is the single most important evaluation factor, this importance is outweighted by the collective emphasis on the five factors.

EVALUATION FACTOR	EMPHASIS (%)
PRODUCT SCOPE AND FUNCTION	45
EASE OF USE (OF PRODUCT)	10
TECHNICAL CONSIDERATIONS	10
SUPPORT AND SERVICES	15
PRODUCT QUALIFICATIONS	10
VENDOR	10

Relative suitability can be defined as a function of weighted score (or measure of product performance) and relative emphasis in the following way.

$$\textbf{Relative Suitability} = \textbf{(\% Emphasis)} \times \frac{\textbf{(weighted score)}}{\textbf{(max. possible weighted score)}}$$

The ratios of weighted score to maximum possible weighted score for the systems evaluated are shown on the Detailed Evaluation Criteria forms (sections 4.1.3 and 4.2.3).

Applying the above formula to the evaluation data at hand gives the following result.

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY	
		PASS CENTRED SYSTEM	SAS
PRODUCT SCOPE AND FUNCTION	45	23	28
EASE OF USE (OF PRODUCT)	10	5	7
TECHNICAL CONSIDERATIONS	10	4	8
SUPPORT AND SERVICES	15	7	10
PRODUCT QUALIFICATIONS	10	7	4
VENDOR	10	8	5
TOTALS	**100**	**54**	**62**

By using this process, entries in the columns identified by product names will be numbers less than or equal to the percent emphasis number. These numbers can in fact be considered as scores out of the assigned percent emphasis numbers. Vertical totals of suitability for each product will be numbers less than or equal to 100 which can easily be compared across alternatives.

The above table shows, for example, that SAS is considered to be less suitable than the PASS Centred System to the needs as defined in the area of Product Qualifications. The product scored 4 of a possible ten points whilst by contrast, the PASS centred system scored 7 of a maximum possible 10 points for the same evaluation factor.

Suitabilities calculated according to the method described should be viewed as relative measures of the extent to which a product meets a particular user's needs. This suitability will vary according to the completeness of the criteria, user defined weighting factors, percent emphasis and, very obviously, on the scores assigned by the product evaluator. Within this context, therefore, it is very important to note that the evaluation process which has been developed and applied in this way is extremely flexible allowing the user complete discretion to decide which criteria will be used, the weighting factors and the percent emphasis. In short, all that a user of this process needs to depend on are the actual raw scores which were assigned as a result of the hands on testing work.

To illustrate the flexibility of the process, two more examples of product suitability are shown below. The reader will see that the percent emphasis distribution has been changed (while still totalling 100) in each case. In these examples, the individual criteria weighting factors were not changed (though they could have been) and thus the same ratios of weighted score to maximum weighted score were applied.

SIMULATION 1 (SENIOR HIGH SCHOOL PERSPECTIVE)

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY	
		PASS CENTRED SYSTEM	SAS
PRODUCT SCOPE AND FUNCTION	55	29	35
EASE OF USE	20	10	14
TECHNICAL CONSIDERATIONS	5	2	4
SUPPORT AND SERVICES	10	5	7
PRODUCT QUALIFICATIONS	5	3	2
VENDOR	5	4	2
TOTALS	**100**	**53**	**64**

SIMULATION 2 (SENIOR HIGH SCHOOL PERSPECTIVE)

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY	
		PASS CENTRED SYSTEM	SAS
PRODUCT SCOPE AND FUNCTION	50	26	31
EASE OF USE	20	10	14
TECHNICAL CONSIDERATIONS	10	4	8
SUPPORT AND SERVICES	-	-	-
PRODUCT QUALIFICATIONS	20	14	8
VENDOR	-	-	-
TOTALS	**100**	**54**	**61**

6.0 PRODUCT EVALUATIONS - JUNIOR HIGH PERSPECTIVE

While the two minicomputer systems were not physically tested in a junior high school environment, one of the two systems - SAS - was evaluated against the specific Junior High school criteria.

6.1 Evaluation Results and Observations

The following tables show the outcome of the quantitative evaluation of SAS against the detailed evaluation criteria from the junior high school perspective.

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT SCOPE & FUNCTION	**SCHOOL RECORDS**					
	Pre-Registration/Enrollment					
	Create student record	15	10	150		
	- school student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address					
	Registration confirmation notice	3	0	0		
	Feeder school confirmation notice	2	0	0		
	TOTAL Pre-Registration/Enrollment	20	10/30	150	200	.75
	Detailed Data Items					
	Student information	25	8	200		
	- school student I.D. - District student I.D. - Alberta Education student I.D. - last name - middle name - first name - birthdate - current grade - sex - feeder school - home address - telephone number					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE ($W \times S_{max}$)	WT SCORE/MAX WT SCORE

	- emergency contact
	    - name
	    - telephone
	- entry information
	    - entry date
	    - registration code
	    - withdrawal code
	- previous schools (2)
	- homeroom instruction
	- counsellor
	- parent/guardian information (up to 4)
	    - name
	    - address
	    - telephone (home and business)
	    - relationship
	    - occupation
	- locker information
	    - number
	    - combination
	- student indebtedness
	- religious denomination
	- program type
	- number of credits earned
	    - this school
	    - other schools
	- academic history
	- travel information
	    - method
	    - distance
	    - bus pass information
	- parking information
	    - driver's licence
	    - licence plate
	    - parking space
	- medical information
	    - disabilities/behaviours
	    - medications
	    - allergies					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- date of last medical - physician information - health care number - departure information - date - reason - minimum of 6 user defined fields					
	Instructor Information	5	9	45		
	- instructor code - name - address - telephone - social insurance number - language of instruction - certificate number - courses taught - minimum of 6 user defined fields					
	Course information	15	7	105		
	- course code (5 character alpha-numeric) - description - pre-and co-requisites (minimum of 4) - must handle"and"/"or"situation - course type - language of instruction - course accreditation - credit value (2 digits) - pass/fail mark - grade					
	TOTAL Detailed Data Items	45	24/30	350	450	.77

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	25	9	225		
	All reports and inquiries should be available for all or a specified range of records, in various sort orders. - class lists - homeroom lists - student name labels - student address labels - parent address labels - student I.D. cards - student data (alphabetical or numerical order) - parent data (alphabetical or numerical order) - instructor data (alphabetical or numerical order) - course data - student phone list - student name list - student grade list - feeder school list - locker information list - student population by instruction type - fee sheets The system should allow production of user-defined reports/inquiries using available data.					
	TOTAL Reports/Inquiries	25	9	225	250	.9
	TOTAL SCHOOL RECORDS	90	43/70	725	900	.81

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	SCHEDULING					
	Detailed Data Items					
	- Course code - Course section					
	Manual scheduling (Arena Scheduling)	7	10	70		
	Pre-scheduling					
	Course Requests					
	manual entry	5	10	50		
	automated entry	9	0	0		
	- allow student to specify mandatory/compulsory courses, - preferred courses, preferred alternatives, etc. - allow student to specify preferred section, semester, or instructor					
	Edit and validation of course requests	7	5	35		
	- checking of pre- and co-requisites in the current students' requests as well as history files - capability to override pre- and co-requisites - capability to complete pre-requisite checking for students from other District schools.					
	Pre-scheduling reports	9	7	63		
	- potential conflict matrix — for all or a specified range of courses. Additional selection criteria may be					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	based on the number of requests or the number of sections.					
	- course tally					
	- students with no requests					
	- student course request list					
	- min/max request list					
	- min/max credit list					
	- verification tickets					
	- arena scheduling labels					
	- students missing compulsory courses					
	- students requesting specific course or group of courses					
	Master schedule builder					
	Capability to build a master schedule					
	manually	6	8	48		
	automatically	9	0	0		
	Capability of handling a variety of Scheduling units	9	6	54		
	- full year					
	- semester					
	- trimester					
	- quartermester					
	- 6 week unit					
	- any combination of the above					
	User defined timetable rotation/tumble	10	5	50		
	Flexible number of periods per day	10	3	30		
	Capability to specify exclusive male or female sections	5	9	45		
	Capability to maintain current and future year/semester master schedules	8	6	48		

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Scheduling Process					
	User defined scheduling sequence	6	9	54		
	- low grades first					
	- high grades first					
	- A to Z					
	- Z to A					
	Unscheduling of no-shows/withdrawals	5	3	15		
	Scheduling of individual student or small groups of students	6	9	54		
	Capability to reset all students or partially scheduled students	8	5	40		
	Capability to lock scheduling assignments for all students or a group of students	8	0	0		
	Restart capability	8	5	40		
	Course weighting/semester balancing (ensure even course load for students)	8	10	80		
	Blocking of courses	7	7	49		
	Section balancing	8	9	72		
	Class balancing (males-females)	4	7	28		
	Capability to keep scheduling open after school start while starting to use the attendance module	9	9	81		
	Scheduling Reports/Inquiries	10	8	80		
	- student timetables — grid and list format					
	- instructor timetables — grid and list format					
	- room timetables — grid and list format					
	- master schedule					
	- student scheduling conflicts					
	- students partially scheduled					
	- unassigned time					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Junior High Scheduling Requirements					
	Homeroom grouping for core subjects	9	5	45		
	Capability of scheduling any course in any combination and number of time periods	10	5	50		
	TOTAL SCHEDULING	200	160	1181	2000	.63
	STUDENT ATTENDANCE					
	Entry of Attendance Data					
	manual entry	5	7	35		
	automated entry	9	0	0		
	Multiple user-defined absence types	8	9	72		
	Capability to record attendance data at various intervals	10	6	60		
	- daily - twice per day - period by period - subject by subject					
	Attendance history	8	7	56		
	- at least ten days detail - cummulative totals					
	Attendance reports/inquiries	10	8	80		
	- student by class - student by subject - student by period					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	- homeroom attendance					
	- daily summary					
	- weekly summary					
	- monthly summary					
	- multiple absence					
	- capability to produce unexcused absence report for the current day within 30 minutes					
	- the system should allow user defined reports/inquiries using available data					
	TOTAL ATTENDANCE	50	37/60	303	500	.61
	STUDENT MARKS					
	Entry of marks data					
	manual	5	7	35		
	automated	9	0	0		
	Marks data	10	7	70		
	- minimum of 4 term marks plus final mark					
	- letter or percentage grades					
	Student Exams	6	4	24		
	Exam timetable builder					
	- automated					
	- manual					
	Exam Reports/Inquiries					
	- potential exam conflict matrix					
	- exam schedules					

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
	Reports/Inquiries	10	6	60		
	proof list report cards - marks data - final mark, calculated according to user-defined formula attenandance data - class averages - honour lists - potential failure lists - graduation list					
	TOTAL STUDENT MARKS	40	24/50	189	400	.47
	UTILITY FUNCTIONS					
	Backup/Restore	12	5	60		
	Security/Controls	8	8	64		
	TOTAL UTILITY FUNCTIONS	20	13/20	124	200	.62
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	400	277/460	2522	4000	.6305
EASE OF USE	- flexibility - modular, table driven - help facilities - menu driven	60	7	420		
	GRAND TOTAL, EASE OF USE	60	7	420	600	.7

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE

TECHNICAL CONSIDERATIONS	- hardware
	- system software environment
	  - operating system
	  - utilities
	  - database management/system internals/files
	  - networking capabilities
	  - user hooks
	  - modularity of the system
		80	8	640		

	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80	8	640	800	.8

SUPPORT & SERVICES	- local versus where/how far
	- package support and services
	  - software support, custom modifications
	- documentation
	  - user guide, application system, procedural, operations guide, file layouts
	- training
	  - applications system, operational (DP), availability schedule, format, location, prerequisites
	- implementation
	  - training
	  - initialization (conversion,file set-up, output forms)
	  - implementation plan
		70	7	490		

	GRAND TOTAL, SUPPORT & SERVICES	70	7	490	700	.7

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	SCORE (S)	WEIGHTED SCORE (W X S)	MAX WT SCORE (W X S_{max})	WT SCORE/MAX WT SCORE
PRODUCT QUALIFICATIONS		80	4	320		
	- package background - reliability - current development status - number of installations - product development plans - release concept, portability, verticality					
	GRAND TOTAL, PRODUCT QUALIFICATIONS	80	4	320	800	.4
VENDOR		70	5	350		
	- Corporate information - background and history - financial performance - employee base - Market volatility and vendor stability - References - Contractual Terms - maintenance - warranty - ownership rights - discount structure/price limit					
	GRAND TOTAL, VENDOR	70	5	350	700	.5

6.2 Observations

All evaluation observations, as described in section 4.2.3 are equally appropriate for the Junior High school perspective. In addition, the following specific points were tested:

Homeroom grouping for core subjects:	Adequate but indirect method of grouping subjects. No choice is available in the definition of the members of the group.
Capability of Scheduling any course in any combination and number of time periods:	There is reasonable flexibility within the SAS system but the physical timetable are detached from the logical meeting periods and it is impossible to produce physical (that is start time and day to end time) timetables.
Ability to handle tumble/rotation schedules:	The SAS system provides a reasonably large number of tumble/rotation sequences and could comfortably handle Junior High school schedules.

The results of these tests were compared with two microcomputer based packages. The School System developed by Columbia Computing and SIRS developed by MIG Limited.

6.3 Relative Suitability of SIMS to the Junior High Schools

The relative suitability of SIMS to the junior high schools was determined using the same procedure and percent emphasis distribution as was used in the senior high school situation (see section 5.2). The outcome of this procedure is shown in the table below.

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY
		SAS
PRODUCT SCOPE AND FUNCTION	45	28
EASE OF USE	10	7
TECHNICAL CONSIDERATIONS	10	8
SUPPORT AND SERVICES	15	10
PRODUCT QUALIFICATIONS	10	4
VENDOR	10	5
TOTAL	**100**	**62**

The following two tables show alternative determinations of suitability which parallel those provided for the senior high situation presented in section 5.2 of this report.

SIMULATION #1 (JUNIOR HIGH PERSPECTIVE)

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY **SAS**
PRODUCT SCOPE AND FUNCTION	55	34
EASE OF USE	20	14
TECHNICAL CONSIDERATIONS	5	4
SUPPORT AND SERVICES	10	7
PRODUCT QUALIFICATIONS	5	2
VENDOR	5	2
TOTAL	**100**	**63**

SIMULATION #2 (JUNIOR HIGH PERSPECTIVE)

EVALUATION FACTOR	EMPHASIS (%)	RELATIVE PRODUCT SUITABILITY
		SAS
PRODUCT SCOPE AND FUNCTION	50	31
EASE OF USE	20	14
TECHNICAL CONSIDERATIONS	10	8
SUPPORT AND SERVICES	-	-
PRODUCT QUALIFICATIONS	20	8
VENDOR	-	-
TOTAL	**100**	**61**

Since only one of the two minicomputer alternatives was evaluated in detail from the junior high school perspective, a more restrictive interprepation of relative suitability is required. At the very least, the relative suitabilities shown in the tables above can be compared to those for the senior high school to show how much more or less suitable SAS is to each school type. The reader is strongly encouraged to compare the results reported here with those contained in a separate report which deals with the evaluations of microcomputer based systems.

7.0 COMMENTS AND CONCLUSIONS

The major objective of this evaluation project was to comparatively evaluate minicomputer based School Information Management Systems and, in the process, to determine the viability of their use by schools.

Two software systems were evaluated against the same detailed set of criteria and in true minicomputer environments.

Initial experiences of the project teams indicated that considerable development work was required (for both systems) to realize complete School Information Management Systems. Hardware and operating systems environments were found to be very powerful and stable, providing for good printing and multi-user functions. Whilst recent developments of minicomputer SIMS indicate that the amount of development work required has decreased, there is still a need for programming staff to support data communications and regular operation of the minicomputer.

Consideration of cost benefit and complexity factors leads us to believe that the minicomputer based systems which were evaluated through this project are not suitable for use by individual schools. For each of the systems evaluated, the combined cost of hardware and software was in excess of $60,000. In addition, a user can expect to spend approximately two to three thousand dollars per year for essential hardware and software maintenance.

Those considering the implementation of one of the microcomputer based SIMS alternatives which were tested through this work should carefully examine the process for determining product suitability and re-apply it to the raw evaluation data from their particular perspective. Those who seek to identify other alternatives are encouraged to apply the principles of this process to the maximum extent possible.

Between the completion of hands on testing and the production of this report, both systems which were evaluated have undergone further development by the respective companies. Appendix 6 briefly describes some of the more significant recent developments which are known to us.

In closing, it is noted that the project reported on here is part of a more comprehensive evaluation of the distributed approach to school information management. A earlier report addresses the viability of a microcomputer based approach to school information management.

APPENDIX 1

GENERAL QUESTIONNAIRE

This document was distributed to schools for completion as an initial information gathering step in the process to develop evaluation and selection criteria for school information management systems.

EDMONTON PUBLIC SCHOOLS
COMPUTERIZATION OF SCHOOL ADMINISTRATIVE/INFORMATION SYSTEMS

GENERAL QUESTIONNAIRE

Background

The Distributed Systems Services Team has identified a short list of computer software packages specifically designed for the day-to-day student administrative requirements of individual schools. In order to facilitate the selection of the most suitable software alternative, for the EPSD from a District-wide perspective, the attached questionnaire has been prepared with a view of determining the relative importance of the type of information, system functions and features needed by the school(s). In addition, personal interviews will be conducted with each participating school in order to determine each school's specific information requirements, review the type and detail of data needed by the school to streamline its operations and identify any areas of concern.

The questionnaire has been divided into two parts. Part 1 deals with the information needs of a STUDENT ADMINISTRATIVE SYSTEM and Part 2 addresses other information requirements that the school(s) may have.

Part 1 - STUDENT ADMINISTRATIVE SYSTEM

Each item is to be weighted in accordance to its relative importance to the specific institution completing the questionnaire, using the following rating scale.

NONE - Not required.

OPT - "Optional" - a requirement not considered essential but for which preference may be given

IMP - "Should" ("Desireable") ("Important") - a requirement having a significant degree of importance to the objectives of the Student Administrative/Information System

MUST - Mandatory - a requirement that must be met in a substantially unaltered form in order for the software package to meet the schools vital information needs.

Part 2 - OTHER INFORMATION SYSTEMS

Applications should be ranked in accordance with the school's priority to computerize other areas of its operations.

NAME OF SCHOOL (in full) ____

____

Questionnaire completed by: (Name) ____

(Title) ____

PART 1

STUDENT ADMINISTRATION SYSTEM - INFORMATION NEEDS

SECTION A - School records, student records, attendance recording/reporting, student marking process and reporting requirements.

General Overview of the System's Objectives

A computerized student administrative system to resolve and streamline the collecting, transcribing, maintaining and reporting of student data. It is to maintain student related data, provide up-to-date information and prepare reports that are used by administrators, counsellors, instructors, students and parents.

Information Need - Relative Rating Scale Legend:

		Relative Importance			
Column Heading	-	NONE	OPT	IMP	MUST
Degree of importance	-	Not required	Optional	Important	Mandatory

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
1) Registration/Enrollment				
-Entering a student into the school and creating the student record	____	____	____	____
-Registration/Enrollment confirmation notice	____	____	____	____
-Other information needs (specify):				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
2) Student Records				
-Demographic data e.g. name and address, program, type of instruction, medical, class(es), timetable, medical, parents, etc.	____	____	____	____
-History i.e. academic achievements, marks, course attempts, etc.	____	____	____	____
-Student coding e.g. - school ID#	____	____	____	____
- EPSD & Alerta student ID #	____	____	____	____
-Bus Information e.g. bus pass number, pick-up and drop off points, driver name, bus routes etc.	____	____	____	____
-Interface/integration with your school's accounting system (in future)	____	____	____	____
-Other (specify)				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
3) **Student Attendance**	____	____	____	____
-Indicate the frequency that attendance is/should be taken in your school e.g. every period (by class) once per day, twice per day, at homeroom time, etc.				
____________________	____	____	____	____
____________________				
-How often do you need attendance reports e.g. daily, weekly, bi-weekly, etc.?				
____________________	____	____	____	____
____________________				
-How much detailed attendance history does your school require to keep "on-line" for parent, counsellor inquiries e.g. 5 days history, 6 days history etc.?				
____________________	____	____	____	____
____________________				
-What types of attendance reports do you need? e.g. by student, student by class/subject, student by day, exception reports etc. and how frequently do you require each report?				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
4) **School Reports**				
-Directories/class lists	____	____	____	____
-Labels (mailing)	____	____	____	____
-Student ID cards	____	____	____	____
-Schedules (student, teachers, rooms)	____	____	____	____
-Other reports (specify)				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
5) **Instructor Records**				
-Personal and demographic information	____	____	____	____
-Courses taught	____	____	____	____
-Areas of specialty	____	____	____	____
-Certificate number	____	____	____	____
-Other (specify)				
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
6) **Student Marking Process**				
-Comprehensive editing and validation of student marks prior to report card preparation e.g. mark verification, identification of student with unassigned marks etc.	____	____	____	____
-Report card printing	____	____	____	____
-Type of reports e.g. GPA's, honour lists, etc. (Please specify):				
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
-Other information needs (specify):				
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
________________	____	____	____	____
-What is the maximum number of marks per course maintained by your school for a student e.g. 4 mid-term marks, 2 exams and a final mark?				
________________	____	____	____	____
________________				
________________				
________________				
________________				

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
7) Student Exams				
-Exam timetable builder	___	___	___	___
-Exam conflicts matrix	___	___	___	___
-Exam schedules	___	___	___	___
-Other (specify)	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___
8) Courses				
-Course number, short description, detailed description (for annual school handbook), credit values, prerequisites, etc.	___	___	___	___
-Other information requirements (specify):				
______________________________	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___
______________________________	___	___	___	___

SECTION B - STUDENT SCHEDULING

Course requests, prerequisite verfication, request confirmation, student curricular counselling, computerized scheduling, school start up registration, automatic generation of student fee sheets and printing of individual timetables.

THIS SECTION IS APPLICABLE TO HIGH SCHOOLS,
JUNIOR HIGH SCHOOLS AND ELEMENTARY-JUNIOR
HIGH SCHOOLS ONLY

SECTION B - STUDENT SCHEDULING

Course requests, prerequisite verification, request confirmation, student curricular counselling, computerized scheduling, school start up registration, automatic generation of student fee sheets and printing of individual timetables.

Application/Feature Description	Relative Importance NONE	 OPT	 IMP	 MUST
1) Pre-scheduling				
-Comprehensive editing and validation of course requests e.g. prerequisite checking marks verification, identification of students with no requests, insufficient/excessive credits requested	____	____	____	____
-Prescheduling reports e.g. course tally list, exception reports (students missing mandatory/compulsory courses)	____	____	____	____
-Scheduling conflicts matrix	____	____	____	____
-Other information needs (specify):				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
-Other prescheduling reports (specify):				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
2) Master Schedule				
-Master timetable builder	____	____	____	____
i) What course code would you prefer to use e.g. a school course code, EPSD course code or the Alberta course code				
____________________ ____________________	____	____	____	____
ii) Please specify ALL of the scheduling units used by your school, e.g. semester full year, trisemester, six week section, quartermester, etc.				
____________________ ____________________ ____________________				

Application/Feature Description	Relative Importance NONE	OPT	IMP	MUST
iii) Please specify the following: Rotation: ____________ Days per week: ____________ Periods per week: ____________ used in your school's master timetable.				

3) Student Scheduling

	NONE	OPT	IMP	MUST
-Completion of the student scheduling process before the summer break	____	____	____	____
-Ability to preassign sections	____	____	____	____
-Ability for your school to assign scheduling priorities	____	____	____	____
-Automatic scheduling of an individual student i.e. mid-term transfer pupil	____	____	____	____
-Ability to schedule groups of students i.e. unregistered last minute arrivals	____	____	____	____
-Ability to 'UNSCHEDULE" a student or group of students i.e. no shows, students that move away during summer etc.	____	____	____	____
-Restart capabilities e.g. reset assignments for a student and/or course	____	____	____	____
-Course sequencing	____	____	____	____
-Course weighting i.e. ability of the computerized scheduler to distribute course loads evenly so that a student is not scheduled to take an overload of difficult courses in the first semester and a group of relatively easier courses during the second semester	____	____	____	____
-Blocking	____	____	____	____
-Class balancing	____	____	____	____
-Semester balancing	____	____	____	____
-Double room identity e.g. Physical Education all male/female class	____	____	____	____
-Double room identity for mixed classes e.g. Home Economics and Industrial Arts	____	____	____	____

i) What are your present scheduling priorities
e.g. - lower grade students first and so on up to highest grade?

____

e.g. - single section courses before multiple section courses?

____

- CONTINUED ON NEXT PAGE -

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
e.g. - mandatory/compulsory courses first followed by student preferences followed by options/alternatives?				
OR indicate your priorities in the space below:				
-Ability to run schedules from more than one perspective e.g. single sections first then mandatory courses etc. and mandatory courses first and single sections last				
-Other information needs (specify):				
Reports				
-Student schedules				
-Multiple conflicts matrix				
-Partially scheduled students				
-Other (specify):				

4) School Start Up

	NONE	OPT	IMP	MUST
-Generation of fee sheets				
-Ability to schedule all new students (unexpected enrollments) only i.e. the schedules for all previously registered students would not be affected				
-Preparation of timetables in grid format (students, teachers and rooms)				
-Class lists				
-Other (specify):				

THE FOLLOWING ITEMS ARE PERCEIVED TO BE APPLICABLE
TO SCHEDULING IN JUNIOR HIGH SCHOOLS ONLY

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
5) **Special Scheduling Requirements of Junior High Schools**				
-Blocking of course options OR Scheduling students requesting same group of options into the same class or homeroom	____	____	____	____
-Blocking of 2-3 sections of the same course in same time block e.g. Math or Language Arts	____	____	____	____
-Homeroom identity grouping for Language Arts, Social Studies, Science, Math	____	____	____	____
-Ability to handle option courses with varying lengths of instruction e.g. French as an option requires four periods per week whereas other options require three periods per week	____	____	____	____
-Back to back time tabling for double classes	____	____	____	____
-Ability to handle variable time slots by course subject e.g. six periods of Language Arts, five periods of Math, four periods of Social Studies, etc.	____	____	____	____
-Other requirements or unique characteristics associated with the scheduling process for your school				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____

Please specify any idiosyncracies in your schools allocation of subject time e.g. different/variable periods (standard period = 40 minutes, course x has a period of 30 minutes, etc.)

PART 2 - OTHER INFORMATION SYSTEMS

Please rank the importance of each application in accordance with your schools priority to computerize other areas of its operations, e.g. 1, 2, 3 etc., from most important to least important. If an application is not perceived to be a requirement indicate a priority of "0" (zero) or "NIL".

Application/System or Sub-system	Implementation Priority
Accounts Payable	
Accounts Receivable	
Budgeting	
Computer Assisted Instruction (CAI, CAL, CML)	
Cost Accounting	
Financial (General Ledger and Financial Statements)	
- also indicate whether or not you require commitments to be included i.e. encumberance accounting Yes or No ____________	
Fixed Assets	
Inventory Control	
Library Services	
Purchasing	
Word Processing	
Work Orders	
Other (Specify)	

APPENDIX 2

INTERVIEW GUIDE AND DETAILED CHECKLIST

This document was used to facilitate a follow-up interview with surveyed schools to clarify and confirm their responses to the general questionnaire.

EDMONTON PUBLIC SCHOOLS

COMPUTERIZED INFORMATION SYSTEMS NEEDS OF INDIVIDUAL SCHOOLS

INTERVIEW GUIDE AND DETAILED CHECKLIST

SECTION A - School records, student records, attendance recording/reporting, student marking process and reporting requirements.

Application/Feature Description	Relative Importance NONE	 OPT	 IMP	 MUST
1) Registration/Enrollment				
Use questionnaire.				
2) Student Records				
-Personal/Demographic	____	____	____	____
-Courtesy name	____	____	____	____
-Academic	____	____	____	____
-Activities	____	____	____	____
-Medical	____	____	____	____
-Program	____	____	____	____
-Type of instruction	____	____	____	____
-Timetables	____	____	____	____
-Courses and classes	____	____	____	____
-Student history to include all courses/marks while in the school	____	____	____	____
OR Does the school want to include all marks the student has achieved while in a similar level of school e.g. High School, Grades 10-12; Junior High, Grades 7-9 etc. Specify level of detail needed below: ________________________________ ________________________________	____	____	____	____
-Complete history of each course that each student attempts, including the number of attempts	____	____	____	____
-Parent data up to a maximum of 2 parents per student	____	____	____	____

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
-Is a limit of 2 parents sufficient? Yes or No ____________________				
-Bus pass number	____	____	____	____
-Bus route(s)	____	____	____	____
-Driver name	____	____	____	____
-Pick-up and drop off points	____	____	____	____
-Student ID # (indicate whether the school has a preference for its own unique ID system or the EPSD ID #)				
____________________	____	____	____	____
-Multiple ID's for cross referencing and interface with EPSD and Alberta	____	____	____	____

3) **Student Attendance**

Use questionnaire.

4) **School Reports**

Use questionnaire.

5) **Instructor Records**

Use questionnaire.

6) **Student Marking Process**

	NONE	OPT	IMP	MUST
-Report cards prepared by school rather than ISB Yes or No ____________ If Yes indicate level of importance	____	____	____	____
-Student marks proof listing for verification before production of report cards	____	____	____	____
-Student transcripts	____	____	____	____

7) **Student Exams**

Use questionnaire.

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
8) **Courses**				
-Term weight	___	___	___	___
-Included/excluded from report card average	___	___	___	___
-Pass/Fail mark	___	___	___	___
-Other (specify):				
___	___	___	___	___
___	___	___	___	___
___	___	___	___	___

SECTION B - STUDENT SCHEDULING

N.B. THIS SECTION SHOULD BE COMPLETED FOR HIGH SCHOOLS AND JUNIOR HIGH SCHOOLS ONLY

Application/Feature Description	Relative Importance			
1) **Pre-scheduling**				
-Student course/program/curriculum counselling list	___	___	___	___
-Marks verification as part of prerequisite checking e.g. 49% in Math 10 is not acceptable for entry into Math 20 course but is acceptable for Math 23	___	___	___	___
In this case should the student be advised of his/her options before the scheduling simulation i.e. repeat Math 10 or opt for Math 23? Yes or No ___________?	___	___	___	___
-Ability for the individual student to identify his/her				
a) mandatory/compulsory courses	___	___	___	___
b) preferred course requests	___	___	___	___
c) preferred alternatives	___	___	___	___

CONTINUED

Application/Feature Description	Relative Importance			
	NONE	OPT	IMP	MUST
-Ability to conduct prerequisite checking for students from another school within the EPSD	____	____	____	____
-Ability to handle co-requisites	____	____	____	____
-Ability to add student records from another EPSD school into your microcomputer e.g. transfer student, graduate student from a feeder school etc.	____	____	____	____

2) **Master Schedule**

-Current Semester	____	____	____	____
-Current Year	____	____	____	____
-Future Semester(s)	____	____	____	____
-Other (specify):				
____________________	____	____	____	____
____________________	____	____	____	____
____________________	____	____	____	____

3) **Student Scheduling**

-Access to scheduling alorithim e.g. logic, parameters, scheduling resolutions, options etc.	____	____	____	____
-"Teacher Link Courses" e.g. in the instance where a teacher is instructing English 10 and Social 10, a common core of students should be scheduled to this teacher for both courses (subjects)	____	____	____	____
-Arena scheduling	____	____	____	____
-Student section selection (preference)	____	____	____	____
-Student instructor selection (preference)	____	____	____	____
-Reduced term requests i.e. scheduling a student into, say, the second semester of a full year English course in order to improve his/her grade without repeating the first semester which he/she passed satisfactorily	____	____	____	____
-Specific term requests e.g. Biology 10 in first semester and Biology 20 in the second semester	____	____	____	____

CONTINUED

Application/Feature Description

Relative Importance

NONE OPT IMP MUST

-Other requirements for an in-house computerized scheduler:
- use data from questionnaire and interview

4) **School Start Up**

Use questionnaire.

5) **Special Scheduling Requirements of Junior High Schools**

Use questionnaire.

ENSURE THAT THE JUNIOR HIGH SCHOOL IDENTIFIES ITS UNIQUE NEEDS AND DEFINES ANY ITEMS OR AREAS THAT DIFFER FROM THE NORM.

PART 2 - OTHER INFORMATION SYSTEMS

ACCOUNTS PAYABLE (A/P)

1) Open item or balance forward

2) Does the school issue its own A/P cheques?

If Yes how many cheques does it issue per month on the average?

3) What is the average number of General Ledger distributions per vendor invoice?

4) If the school has indicated that the computerization of its Accounts Payable application is a need, obtain a general description of what the school expects from an automated system e.g. type of reports, statistical analysis, breakdown of A/P expenses (how?) etc.

5) Should the school's purchase orders be included in the A/P system to reflect commitments?

ACCOUNTS RECEIVABLE (A/R)

1) Open item or balance forward

2) How many invoices does the school issue per month?

3) Does the school issue monthly statements for unpaid accounts?

4) Why does the school want to automate its A/R application?
e.g. expected results, type and frequency of reports, revenue analysis, etc.?

BUDGETING

If computerization of General Ledger and Financial Statements are a need identified by the school suggest that the Budgeting application should be included as an integral part of the former system.

1) What information and/or statistical breakdowns do we need for budgeting e.g.:

-student count by category or program (ESL pupils, native children, etc.)

-previous years financial statements by department, program, cost centre, etc.

FINANCIAL (GENERAL LEDGER AND FINANCIAL STATEMENTS)

1) Should commitments be included in the schools financial reports i.e. encumberance accounting in order to ensure that the school knows where it stands in relation to its budget?

For example:

Total budget - (actual expenditures + PO commitments) = the balance available in the budget

2) Does the school require any interface/integration between its financial and student administrative system?

3) What type of G/L coding structure does the school envision?

e.g. EPSD G/L code

or

The schools own G/L code

4) How many G/L accounts does the school now use?

5) What objectives is the school seeking through computerization of its financial information i.e. type and frequency of reports, budget analysis etc.

6) How many different fund sources does the school have?

e.g.

EPSD funds (from provincial and municipal taxes)

TRIM funds (Text book rental, fees and instructional materials)

Special project funds derived from school initiatives i.e. car washes, bottle drive etc., for field trips (glee club, band, soccer team)

Other

7) Does the school require separate financial statements for each fund it is responsible for?

8) Are consolidated financial statements required by the school?

9) What other financial information does the school need?

COMPUTER ASSISTED INSTRUCTION

Obtain a general description of the schools needs and expectations in this area.

Cost Accounting

1) Could the schools requirements in this area be included in the general ledger financial statements. If not obtain a conceptual overview of the type of cost accounting information required by the school.

FIXED ASSETS

1) What general class of items does the school want to include in this application?

2) Are the school's fixed assets currently tagged with a permanent identifier?

3) Approximately how many items does the school estimate it would include in its automated fixed asset sysem?

4) Obtain a brief conceptual overview of what the school expects from a fixed asset system.

5) What type and frequency of reports does the school need from this system.

INVENTORY CONTROL

1) Does the school have a central storage facility?

2) What type(s) of inventory and how many items, issues and receipts does the school wish to control?

e.g. Automotive shop

Wood shop

Home Economics, etc.

3) Does the school need to integrate its purchase orders with inventory control?

4) What does the school need in the way of an inventory control system? Describe briefly.

LIBRARY SERVICES

1) How many books does the school estimate to have in its library?

2) Computerized needs

-Cross Reference by Author?
Title?
Publisher?
Subject?
Key words?

-Checkout/Renewal

-Returns

-Overview notices/lists

-Fines

-Other

3) Statistics e.g. usage?

4) Obtain a general conceptual overview of the schools needs in this area.

PURCHASING

General requirements, volumes and brief conceptual overview.

WORD PROCESSING

Estimated volumes, frequencies

Type of word processing needed i.e.

- personalized letters
- mass mailings
- reports
- general correspondence

Try to determine an estimate of the school's current work load.

WORK ORDERS

Estimated Volumes

How are they handled now?

Are W/O's costed out e.g.

labour $

material $

Are W/O's integrated into the financial system?

General conceptual overview and description of system needs

APPENDIX 3

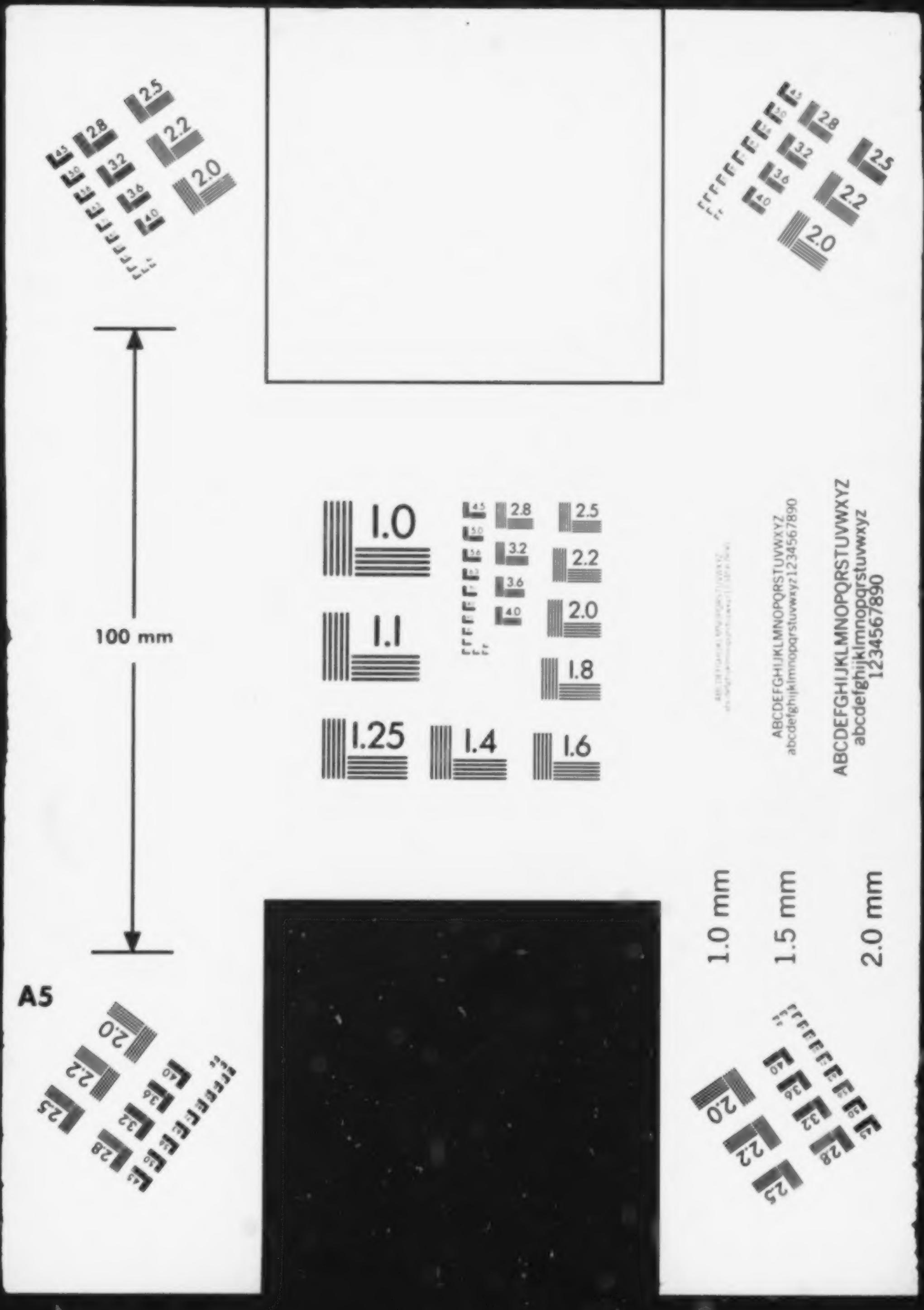
DETAILED SCORING COMPARISON FORM

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	PRODUCT 1:		PRODUCT 2:		PRODUCT 3:	
			SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
PRODUCT SCOPE & FUNCTION	**SCHOOL RECORDS**							
	Pre-Registration/Enrollment							
	Create student record	15						
	Registration confirmation notice	3						
	Feeder school confirmation notice	2						
	TOTAL Pre-Registration/Enrollment	20						
	Detailed Data Items							
	Student information	25						
	Instructor Information	5						
	Course information	15						
	TOTAL Detailed Data Items	45						
	Reports/Inquiries	25						
	TOTAL Reports/Inquiries	25						
	TOTAL SCHOOL RECORDS	90						
	SCHEDULING							
	Manual scheduling (Arena Scheduling)	7						

Detailed Scoring Comparison Form

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	PRODUCT 1: SCORE (S)	PRODUCT 1: WEIGHTED SCORE (W X S)	PRODUCT 2: SCORE (S)	PRODUCT 2: WEIGHTED SCORE (W X S)	PRODUCT 3: SCORE (S)	PRODUCT 3: WEIGHTED SCORE (W X S)
	Pre-scheduling							
	Course Requests							
	manual entry	5						
	automated entry	9						
	Edit and validation of course requests	7						
	Pre-scheduling reports	9						
	TOTAL Pre-Scheduling	30						
	Master schedule builder							
	Capability to build a master scheduler							
	manually	6						
	automatically	9						
	Capability of handling a variety of scheduling units	9						
	User defined timetable rotation/tumble	10						
	Flexible number of periods per day	10						
	Capability to specify exclusive male or female sections	5						
	Capability to maintain current and future year/semester master schedules	8						
	TOTAL Master Schedule Builder	57						
	Scheduling Process							
	User defined scheduling sequence	6						
	Unscheduling of no-shows/withdrawals	5						

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	PRODUCT 1:		PRODUCT 2:		PRODUCT 3:	
			SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
	Scheduling of individual student or small groups of students	6						
	Capability to reset all students or partially scheduled students	8						
	Capability to lock scheduling assignments for all students or a group of students	8						
	Restart capability	8						
	Course weighting/semester balancing (ensure even course load for students)	8						
	Blocking of courses	7						
	Section balancing	8						
	Class balancing (males-females)	4						
	Capability to keep scheduling open after school start while starting to use the attendance module	9						
	TOTAL Scheduling Process	77						
	Scheduling Reports/Inquiries	10						
	Junior High Scheduling Requirements							
	Homeroom grouping for core subjects	9						
	Capability of scheduling any course in any combination and number of time periods	10						
	TOTAL SCHEDULING	200						
	STUDENT ATTENDANCE							
	Entry of Attendance Data							
	manual entry	5						
	automated entry	9						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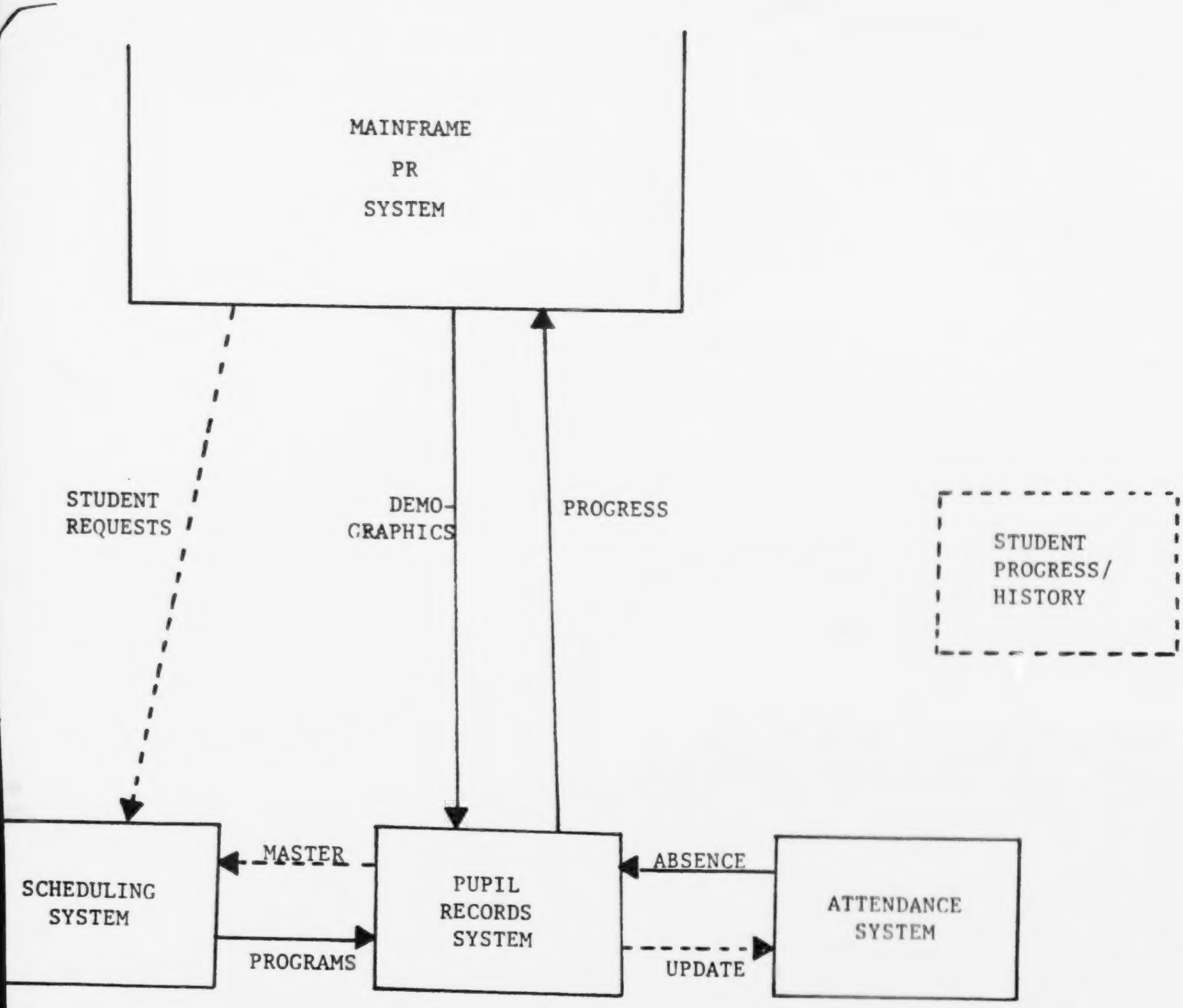
EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	PRODUCT 1:		PRODUCT 2:		PRODUCT 3:	
			SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
	Multiple user-defined absence types	8						
	Capability to record attendance data at various intervals	10						
	Attendance history	8						
	Attendance reports/inquiries	10						
	TOTAL ATTENDANCE	**50**						
	STUDENT MARKS							
	Entry of marks data							
	manual	5						
	automated	9						
	Marks data	10						
	Student Exams	6						
	Exam timetable builder Exam Reports/Inquiries							
	Reports/Inquiries	10						
	TOTAL STUDENT MARKS	**40**						

EVALUATION FACTOR	CRITERIA ITEMS	WEIGHT (W)	PRODUCT 1		PRODUCT 2		PRODUCT 3	
			SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)	SCORE (S)	WEIGHTED SCORE (W X S)
	UTILITY FUNCTIONS							
	Backup/Restore	12						
	Security/Controls	8						
	TOTAL UTILITY FUNCTIONS	20						
	GRAND TOTAL, PRODUCT SCOPE AND FUNCTION	400						
EASE OF USE		60						
	GRAND TOTAL, EASE OF USE	60						
TECHNICAL CONSIDERATION		80						
	GRAND TOTAL, TECHNICAL CONSIDERATIONS	80						
SUPPORT & SERVICES		70						
	GRAND TOTAL, SUPPORT & SERVICES	70						

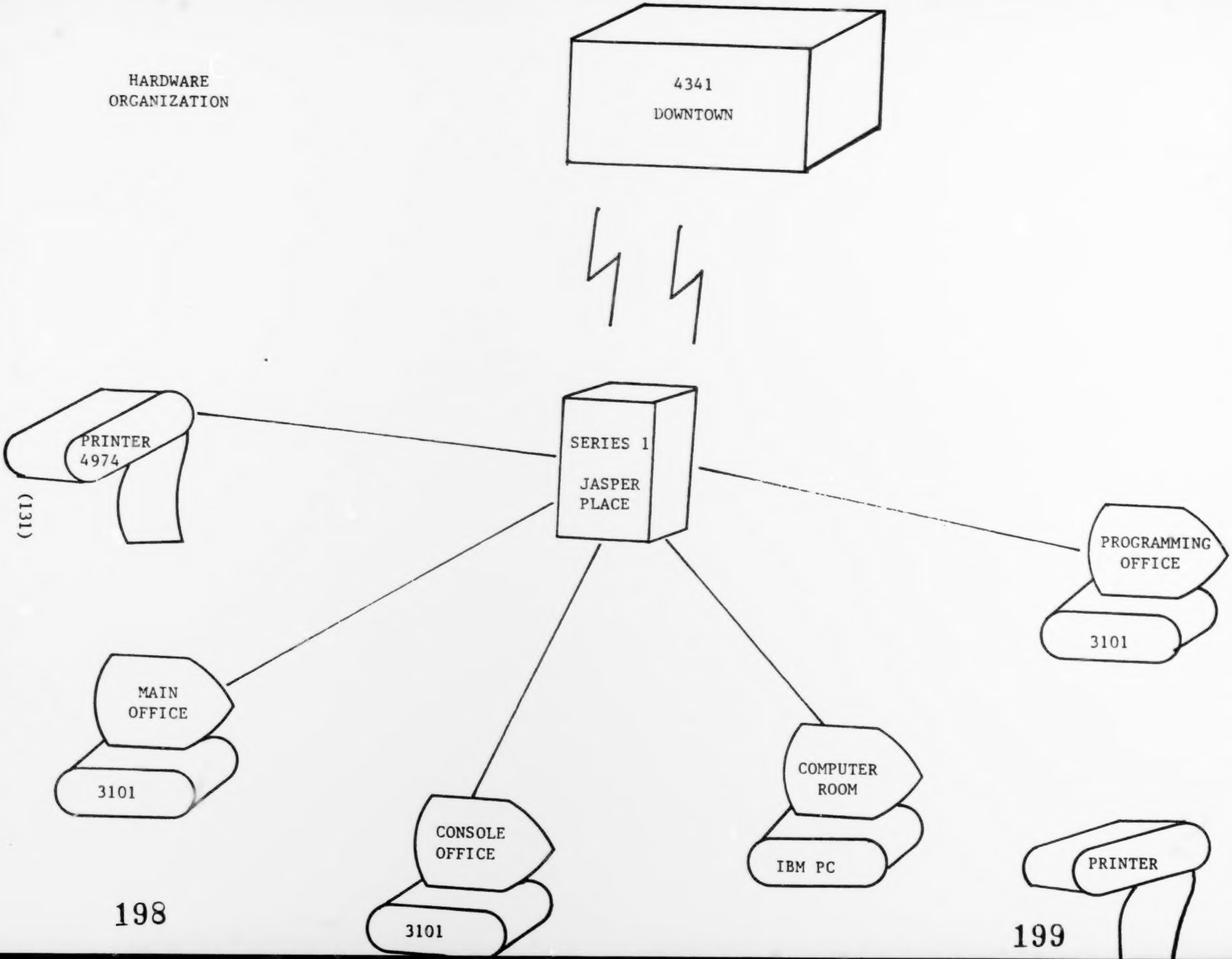
EVALUATION FACTOR	CRITERIA ITEMS (W)	WEIGHT (S)	PRODUCT 1:		PRODUCT 2:		PRODUCT 3:	
			SCORE SCORE (W X S)	WEIGHTED (S)	SCORE SCORE (W X S)	WEIGHTED (S)	SCORE SCORE (W X S)	WEIGHTED
PRODUCT QUALIFICATIONS		80	_____	_____	_____	_____	_____	_____
	GRAND TOTAL, PRODUCT QUALIFICATIONS	80	☐	☐	☐	☐	☐	☐
VENDOR		70	_____	_____	_____	_____	_____	_____
	GRAND TOTAL, VENDOR	70	☐	☐	☐	☐	☐	☐

APPENDIX 4: MID-AMERICAN PASS Screen and Program Functions

Distributed Systems Team Developed Programs


MAINFRAME
PR
SYSTEM
STUDENT REQUESTS
DEMOGRAPHICS
PROGRESS
STUDENT PROGRESS/ HISTORY
SCHEDULING SYSTEM
MASTER
PROGRAMS
PUPIL RECORDS SYSTEM
ABSENCE
UPDATE
ATTENDANCE SYSTEM

HARDWARE ORGANIZATION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DOWNTOWN
SERIES 1
JASPER PLACE
PRINTER
4974
PROGRAMMING OFFICE
3101
MAIN OFFICE
3101
CONSOLE OFFICE
3101
COMPUTER ROOM
IBM PC
PRINTER

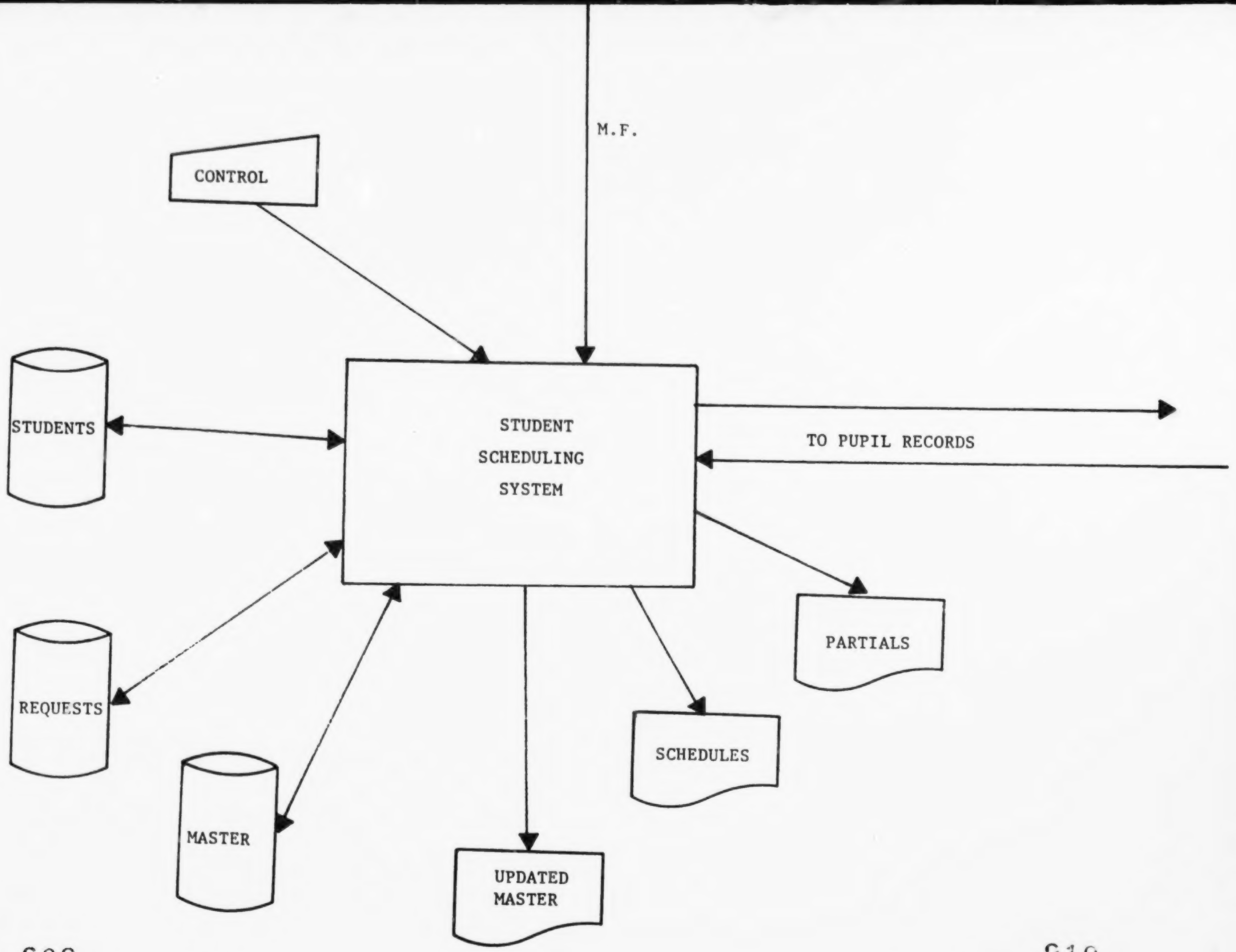
```
                    PROMPT DATA BASE FACILITIES                    VOLUME: SCHED

 -SPECIFICATION-       -EDITING-         -EXECUTION-          -EXECUTION/UTILITIES-

 A1 - FCB           B1 - FCB/SCREEN   C1 - DATA ENTRY          D1 - FCB LIST
 A2 - AMEND         B2 - AMEND        C2 - FILE AMEND          D2 - FILE MAINTENANCE
 A3 - CONVERSION    B3 - CONVERSION   C3 - FILE CONVERSION     D3 - FILE COPY/RENAME
 A4 - INQUIRY       B4 - INQUIRY      C4 - FILE INQUIRY        D4 - FILE INDEXER
 A5 - REPORT        B5 - REPORT       C5 - REPORT WRITER       D5 - FILE SEQUENCER
 A6 - PROCESSOR     B6 - PROCESSOR    C6 - TRANS PROCESSOR     D6 - FILE DELETE
 A7 - MENU          B7 - MENU         C7 - MENU MANAGER        D7 - FILE EMPTY
 A8 - SORT/MERGE                      C8 - SORT/MERGE          D8 - SORT/MERGE LIST
 A9 - EXTRACT                         C9 - FILE EXTRACT        D9 - EXTRACT LIST
A10 - SCREEN                                                  D10 - FILE MOVE
                                                              D11 - SORT (1 FILE)
                                                              D12 - MERGE (2 FILES)
                                                              D13 - PARMFILE MANAGER
  ENTER OPTION:           (E = END PROMPT)                    D14 - CHANGE VOLUME
                                                              D15 - ENTER PROGRAM

  'PROMPT' IS THE REGISTERED TRADEMARK OF MID-AMERICAN CONTROL CORPORATION
```

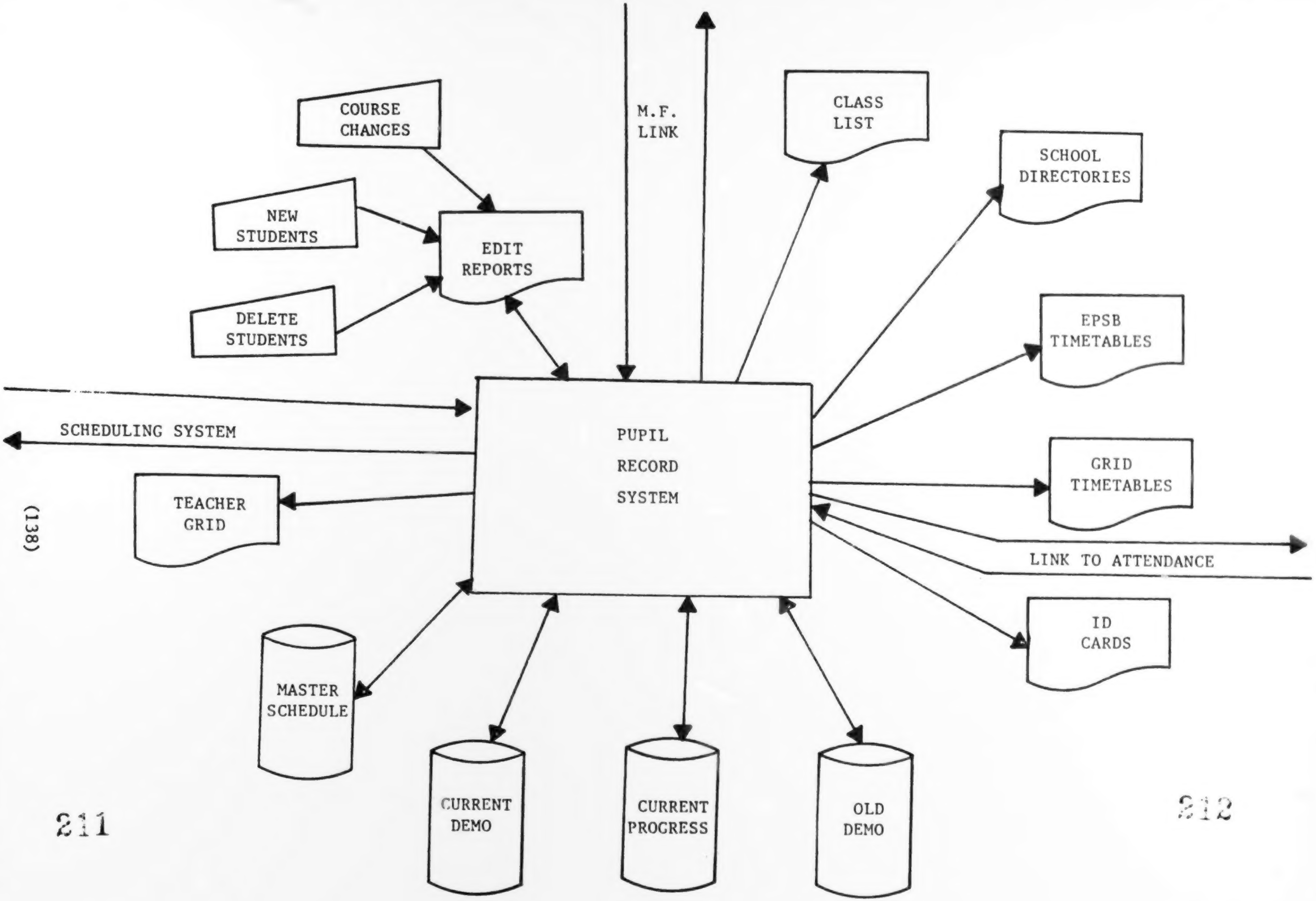
```
                    UPDATE STUDENT RECORDS                  VOLUME: WORK

  1 -- ENTER DEMO INFORMATION               12 -- END OF BATCH PROCEDURES
  2 --      NEW STUDENTS                    13 --      UPDATE MAIN FRAME
  3 --      RETURNING STUDENTS              14 --      UPDATE SERIES 1 MINI
  4 -- CHANGE STATUS                        15 --      UPDATE ATTENDANCE FILES
  5 --      DELETE STUDENTS                 16 -- PRINT CLASS LISTS
  6 --      STUDENT CHANGES                 17 -- CHECK STATUS
  7 --      ADD/DELETE COURSES              18 --      CHECK BY STUDENT ID#
  8 --      UPDATE JP ID #                  19 --      CHECK BY SURNAME
  9 -- GET DATA FILES                       20 --      CHECK BY EPSB ID#
 10 --      ADD JP ID TO NEW STUDENTS       21 --      CHECK PROGRESS REC
 11 --      STUDENT PROGRESS RECORDS        99 -- END MENU

OPTION ?
```

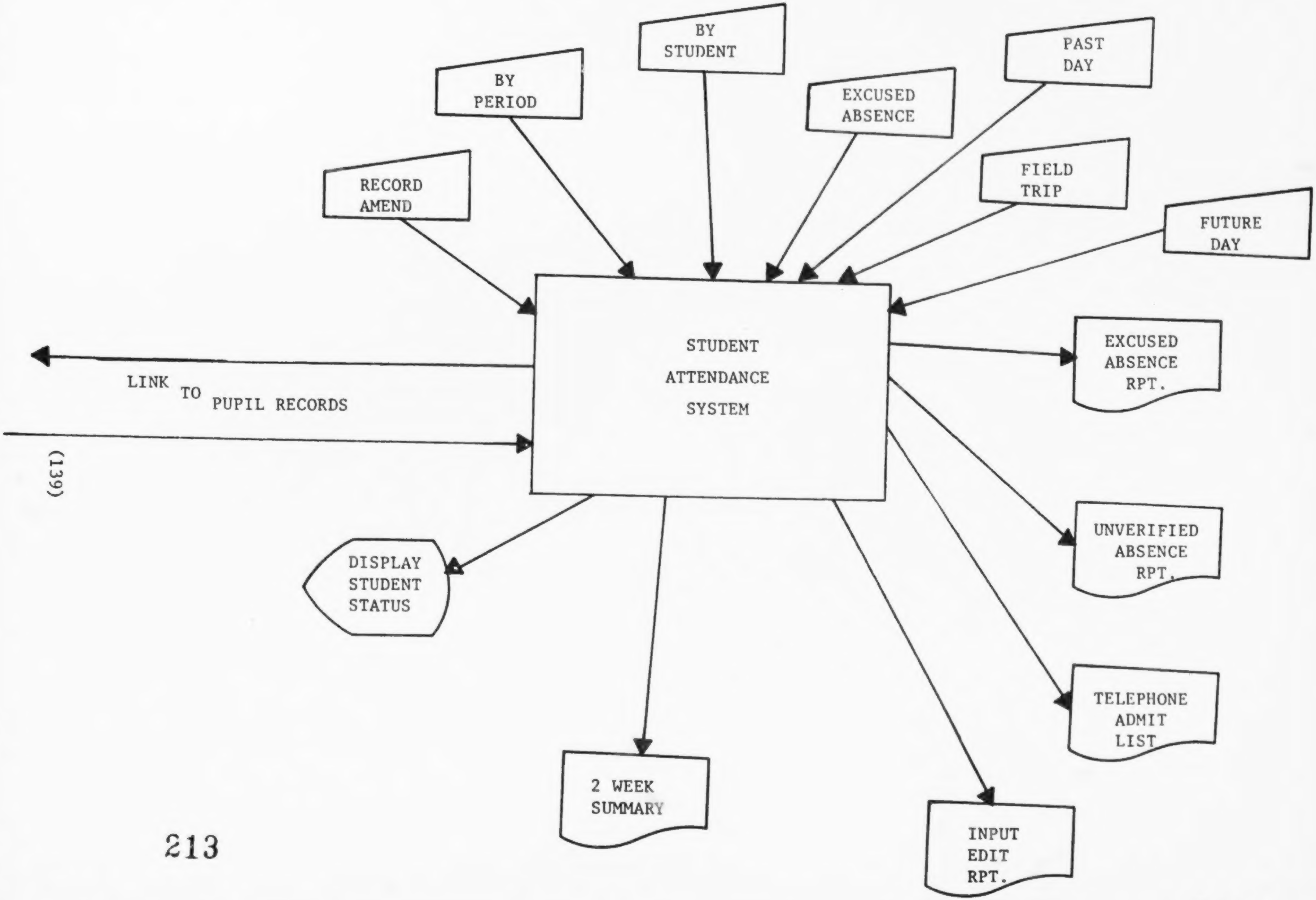
```
                   SCHEDULING PHASE II PROCEDURES       VOLUME: SCHED

  1 -- S C H O O L   D A T A            9 -- M A S T E R   S C H E D U L E
  2 -- ADD NEW SCHOOL                  10 -- ADD SECTION TO MASTER SCHEDULE
  3 -- PRINT SCHOOL MASTER             11 -- PRINT MASTER SCHEDULE LIST
  4 -- CHANGE OR DELETE SCHOOL         12 -- CHANGE/DELETE COURSE SECTIONS
  5 -- I N S T R U C T O R   D A T A   13 -- S P E C I A L   R E P O R T S
  6 -- ADD NEW INSTRUCTOR              14 -- INSTRUCTOR CONFLICT ANALYSIS
  7 -- PRINT INSTRUCTOR MASTER LIST    15 -- ROOM CONFLICT ANALYSIS
  8 -- CHANGE OR DELETE INSTRUCTOR     99 -- END MENU

 OPTION ?
```

```
               SCHEDULING PHASE III PROCEDURE          VOLUME: SCHED

 1 -- -- -- -- -- -- -- -- -- -- -- --  19 -- S T U D Y   H A L L   P R O C.
 2 -- INITIALIZE SCHEDULING MASTERS     20 --   CREATE DEFAULT STUDY HALLS
 3 -- --  --  --  --  --  --  --  --    21 --   ENTER STUDY HALL SECTIONS
 4 --                                   22 --   INITIALIZE STUDY HALL COUNTS
 5 -- -- -- -- -- -- -- -- -- -- -- --  23 --   AMEND STUDY HALL SPECS.
 6 --          SCHEDULING RUN           24 --   SCHEDULE STUDY HALLS
 7 -- -- -- -- -- -- -- -- -- -- -- --  25 --   PRINT STUDY HALL LIST
 8 -- S C H E D L .   R E S U L T S    26 --   INSERT STUDY HALLS TO SCHED.
 9 --   MASTER SCHEDULE TALLYS          27 --
10 --   LAST SCHEDULES PRODUCED         28 -- H A N D   S C H E D U L I N G
11 --   SCHEDULES WITH CONFLICTS        29 --   ADD COURSE TO SCHEDULE
12 --   PARTIAL SCHEDULES               30 --   CHANGE EXISTING SCHEDULE
13 --                                   31 --
14 -- F I N A L   R E S U L T S        32 -- S P E C I A L   R E P O R T S
15 --   STUDENTS NOT SCHEDULED          33 --   PRINT CLASS ROSTERS
16 --   COMPLETE SCHEDULE DUMP          34 --   PRINT FINAL SCHEDULES
17 --   FREE PERIOD ANALYSIS            35 --   PRINT TEACHER SCHEDULES
18 --                                   36 --
                          99 -- END MENU

OPTION ?
```

```
                        STUDENT ATTENDANCE SYSTEM           VOLUME: STUDT

  1 -- ENTER ABSENCES                         15 -- GENERATE ABSENT REPORT
  2 --      BY PERIOD                         16 --      ABSENCES -CURRENT DAY
  3 --      BY STUDENT ID#                    17 --      EXCUSED ABSENCE LIST
  4 --      BY EXCUSED ABSENCES               18 --      AD HOC ATTENDANCE REPORTS
  5 -- CHECK STATUS                           19 --
  6 --      BY STUDENT ID#                    20 -- END OF DAY PROCEDURES
  7 --      BY SURNAME                        21 --      UNVERIFIED ABSENCE LIST
  8 --      BY EPSB ID#                       22 --      PREPARE FOR NEXT DAY
  9 --                                        23 --
 10 -- CHANGE STATUS                          24 -- END OF REPORT PERIOD
 11 --      CURRENT DAY                       25 --      SAVE DATA
 12 --      PAST DAY(S)                       26 --      SET NEW PERIOD
 13 --      FUTURE DAY(S)                     27 --
 14 --      FIELD TRIP                        28 -- PRINT CLASS LISTS
                          99 -- END MENU

 OPTION ?
```


M.F.
CONTROL
STUDENTS
STUDENT
SCHEDULING
SYSTEM
TO PUPIL RECORDS
REQUESTS
MASTER
UPDATED
MASTER
SCHEDULES
PARTIALS


COURSE CHANGES
NEW STUDENTS
DELETE STUDENTS
EDIT REPORTS
M.F. LINK
CLASS LIST
SCHOOL DIRECTORIES
EPSB TIMETABLES
SCHEDULING SYSTEM
PUPIL RECORD SYSTEM
GRID TIMETABLES
TEACHER GRID
LINK TO ATTENDANCE
ID CARDS
MASTER SCHEDULE
CURRENT DEMO
CURRENT PROGRESS
OLD DEMO


BY PERIOD
BY STUDENT
EXCUSED ABSENCE
PAST DAY
RECORD AMEND
FIELD TRIP
FUTURE DAY
STUDENT ATTENDANCE SYSTEM
LINK TO PUPIL RECORDS
EXCUSED ABSENCE RPT.
UNVERIFIED ABSENCE RPT.
DISPLAY STUDENT STATUS
TELEPHONE ADMIT LIST
2 WEEK SUMMARY
INPUT EDIT RPT.

JP SCHEDULING RUNS

1984 - 85

DATE	NUMBER OF STUDENTS	MAINFRAME		MINICOMPUTER	
		SIMUL	TRIAL	SIMUL	TRIAL
JUNE 14	1,775	319	369		
JUNE 18	1,775	266	321	263	
JUNE 23	1,782	203	259	207	
JULY 3-4	1,797	217	257	210	260
JULY 30	1,800	203	289		227
AUG. 3	1,800	193	228	193	231
AUG. 13	1,800	35	71		80
AUG. 16	1,800	41	77		81
AUG. 20	1,804				76
AUG. 22	1,824		117		111
AUG. 23	1,823		107		104
AUG. 29	51				19
AUG. 31	38				19
SEPT. 4	18				3
SEPT. 7	12				8

APPENDIX 5: IBM 4341 and SERIES 1 to VAX 11/725

Data Transfer

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3.0 SERIES/1 Data Conversion

4.0 SERIES/1 to IBM/PC Transfer

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6.0 DEC RAINBOW 100 to VAX-11 Transfer

7.0 VAX-11 Data Conversion

8.0 Summary and Results

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  A.2.1 IBM 4341 Data
  A.2.2 SERIES/1 Data
  A.2.3 IBM/PC Data
  A.2.4 VAX-11 Data

A.3 IBM/PC Program Listings

A.4 VAX RMS Utility For Data Conversion

1.0 INTRODUCTION

To provide a realistic environment for testing the School Administrative System (SAS) from SIERRA, the scheduling subsystem in particular, the SAS data base was to be initialized with student demographic and course request data from Jasper Place High School 83/84 school year. This data had been downloaded from the IBM 4341 mainframe to an IBM SERIES/1 minicomputer. The initialization process began with retrieving data relevant to the SAS system from the SERIES/1 and downloading the data to an IBM/PC. This data was restructured according to SAS record formats and placed on diskettes which could be read by a DEC RAINBOW 100 microcomputer. Using a software communication package, POLY-COM, a RAINBOW computer transfered the data to the VAX 11/725 minicomputer. Finally, the student data were loaded into the SAS data base by using the VAX Record Management Services utility. A graphic representation of this process was given in Appendix A.1.

The method used to transfer data to the VAX system required manual intervention at various stages. However, this method sufficed for limited applications such as creating test data. The Jasper Place High School student data for 83/84 already existed in a file in the IBM SERIES/1. Using a SERIES/1 utility, "PROMPT", the required student data could be easily retrieved and formatted according to SAS requirement. Thus processing of Pupil Records at the mainframe and subsequent downloading from the mainframe were eliminated. The downloading procedure from SERIES/1 to IBM/PC had been thoroughly tested. Once downloaded to a PC file, other conversion procedures could be performed on the data as required.

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2.0 MAINFRAME TO SERIES/1 TRANSFER

Student demographic and course request data for all Edmonton public schools are maintained as part of the Pupil Record (PR) database in the IBM/4341 mainframe. A user program was used to select from the PR records data which were relevant to the school administrative system running on the IBM SERIES/1 computer. The selected data were placed in a punch file for downloading to the SERIES/1.

The SERIES/1 was connected to the mainframe through a leased line using point to point bisynchronous communication. A VSERJE facility in the SERIES/1 enabled it to function as a remote job entry station to the mainframe. The selected PR data file was then downloaded to a pre-allocated file in the SERIES/1. Because the data were created as a punch file, three records were needed for each student. A program was run to organize each student's data into one record.

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3.0 SERIES/1 DATA CONVERSION

The SERIES/1 file which was used as the source for SAS data contained both student demographic and course request data (see Appendix A.2.1). In SAS, system student demographic data and course request data were maintained as separate files (see Appendix A.2.4). Hence before these data could be loaded into the SAS data base they must be converted to conform to SAS record formats.

Several limitations influenced the overall data conversion. First, while the SAS student records were 330 characters long, only 79 character records could be properly downloaded from the SERIES/1 to an IBM/PC. Furthermore, the maximum record size in an IBM/PC sequential file was 255, and the maximum record size which could be transfered from a DEC RAINBOW 100 to a VAX 11/725 using the POLY-COM utility was 254. To overcome this problem, several programs were used in the SERIES/1 to select data from the SERIES/1 file to create four student record files. For each student, a student record was created in each student record file (see Appendix A.2.2). These four files was downloaded to an IBM/PC and subsequently merged to form a student file. The resulting student record was 254 characters long. Fortunately, the remaining fields in the SIERRA student record were not critical to the test environment and could be initialized by the RMS utility to spaces.

The second major limitation in the overall data conversion was the lack of programming facility in the RAINBOW 100 and the VAX 11/725 in particular. Student data must be processed in the SERIES/1 and the IBM/PC. Because of the SERIES/1 utility "PROMPT" which required minimal effort to use, the SERIES/1 was used to perform data manipulation as much as possible to minimize the amount of programming on the IBM/PC.

"PROMPT" was used to produce the four student record files and the course request files for downloading to an IBM/PC. These files were created as reports. The source data of these reports came from the student demographic and course requests data file in the SERIES/1. To create a report, it must first be defined using the "DEFINE REPORT" option. A report definition consisted of information such as report name, type of output (print or video), source file name, source data to be reported and data position on report. For downloading video output must be specified. Each data file in the system must be identified by a FCB (File Control Block) which contained information such as record length and data field attributes. Each data field had associated with it a sequence number. Source data to be reported were specified using their sequence numbers. Once a report had been defined, the "REPORT WRITER" could be used to generate the report.

A conversion step was required prior to reporting if the original source data were not in the proper forms (ie. date was MMDDYY instead of YYYYMMDD) or if fields on report needed initialization (ie. assigning a constant value to a reported field). "DEFINE FCB" was performed to define the file resulting from the conversion. "DEFINE CONVERSION" was performed to specified the conversion rules and the files involved. After a conversion had been run, the report procedure was used to create a report based on the converted file.

4.0 SERIES/1 TO IBM/PC TRANSFER

An IBM/PC was connected to the SERIES/1 using a RS232 interface. A 3101 Emulation Program running on the PC enabled it to function as a 3101 terminal to the SERIES/1. The PC could also save the screen display in a floppy diskette file. This capability was used to transfer data from the SERIES/1 to the PC.

To download a student or course file, the PC was started as a terminal to the SERIES/1. The "REPORT WRITER" of "PROMPT" was invoked to generate a report. Since the report output was defined as video, the report would be displayed on screen. Immediately after entering the report request and prior to any output being displayed, the system must be interrupted by pressing the CTRL and F10 keys. A list of options would be displayed. The "SAVE" option would be chosen and followed by entering the file name under which the displayed report would be saved. The system then resumed with displaying and saving the report. After a screen of data had been displayed the system required the pressing of the entry key to continue. When end of report was reached, the CTRL and F10 keys were pressed to interrupt the system and to select the "END" option to terminate saving of displayed data. If this step was omitted, the system would continue to save displayed data into the file. Pressing the enter key returned the system to "PROMPT".

This method of downloading had its limitations. The report record length should not be greater than 79 because only those characters would be saved. To ensure all the data would be saved, there must be sufficient free space on the disk. Once downloading had started, there was no provision for extending the saved file to another disk. During the downloading the enter key must be pressed after every screen of data had been displayed. Downloading of large files became rather tedious. Another nuisance was that system prompt messages and blank lines were saved with the data. The downloaded file must be further processed to remove these "garbage" data.

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5.0 IBM/PC DATA CONVERSION

The downloaded student and course request data were processed on an IBM PC/XT to forms appropriate for loading into the SAS data base. A program, STUDFM.BAS, was used to remove the garbage data created in the files during downloading. A program, STUDPTCH.BAS, merges the four student files to a single student file (see Appendix A.2.3). Because the resulting student file was too large to fit onto a floppy disk, a program, STUDCOPY.BAS, was used to separate the student file into three floppy disks. Another program, STUDREQU.BAS, was used to adjust the course request data. Separate course codes were assigned to Phyiscal Education classes for male and for female students. Section codes were deleted from the course codes. (See Appendix A.2.3 for resulting record formats and Appendix A.3 for program listings) The final versions of student and course data files were written onto floppy disks which had been formatted as single sided and eight sectors per track. Hence these data became readable by a DEC RAINBOW 100 mico-computer.

6.0 DEC RAINBOW 100 TO VAX-11 TRANSFER

The RAINBOW was used to interface data transfer from the IBM/PC to the VAX 11/725. The RAINBOW was connected to the VAX through a serial interface. To perform the data transfer, the RAINBOW was booted as a stand alone system operating under MS-DOS. The PC files created on special formatted diskettes were read by the RAINBOW and transfered to the VAX using POLY-COM.

POLY-COM was a communication software package for installation in a DEC RAINBOW 100 mini-computer which was connected by an RS232 interface to a VAX mini-computer. This software enabled the RAINBOW to emulate a remote terminal to the VAX. While in emulation mode, file transfer could be performed between the VAX/VMS operating system and the CP/M DOS operating system. Only ASCII data files could be transfered. Transfer of binary data would be possible if a POLY-XFR package was installed in the VAX. As part of the installation process, various POLY-COM screens were used to establish the communication parameters.

POLY-COM was invoked on the RAINBOW using the "TRM" command. Through the resulting selection screen, the RAINBOW was placed in emulation mode. After signing onto the host from the RAINBOW, the "EDIT/EDT filename" command was used to invoke the editor. The specified file name would be the destination of the file transfer. The editor was then placed in insert mode. The "SENDFILE" function of POLY-COM was then invoked by pressing the "SELECT" key followed by the "S" key. A screen prompt would request for the file name of the file to be sent. Entering the file name would initiate the actual data transfer. Thus to transfer the student or course file, the diskette containing that file would be inserted in a RAINBOW disk drive, and the file name would reference that file. Once initiated, data transfer continued until end of file was detected. The editor then returned to edit mode. An "EXIT" command caused an exit from the editor and saved the transfered data. If another file transfer was needed, this procedure was repeated beginning with invoking the editor. To return to the RAINBOW DOS environment, one should log off from the host and then press the "SELECT" key followed by the "X" key.

The maximum record length which could be properly transfered using the POLY-COM utility was 254 characters. If longer records were used, an end of record would be assumed after the 255th character. Thus if record length of 255 (maximum for a IBM/PC DOS file) was used, a record of zero length would be followed every actual record transfered.

7.0 VAX-11 DATA CONVERSION

The data transfered to the VAX were in the form of sequential files. These files must be converted to indexed sequential files which formed parts of the SAS data base. The Record Management Services (RMS) utilities simplified this conversion significantly.

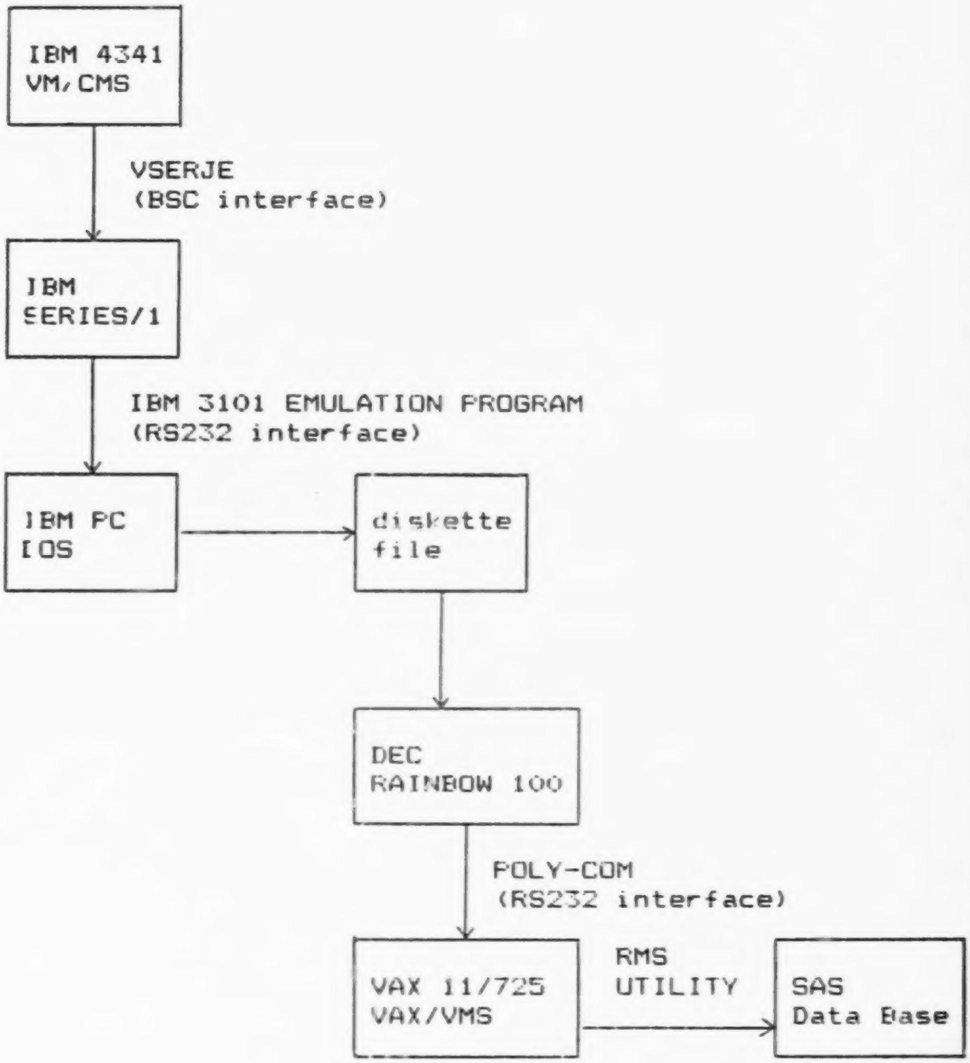
RMS utilities used were "EDIT/FDL" and "CONVERT". Each file in the system may be described by a collection of file attributes. File attributes were specified using the File Definition Language (FDL). The set of FDL statements which described the attributes of a file could be placed in its FDL file. An FDL file could be created using the editor and entering the FDL statements. A much simpler alternative was to use the EDIT/FDL utility. This facility guided the user in creating a FDL file through a series of menus, prompts and a help facility. FDL files, CSSSTUD.FDL and CSSREQU.FDL, were created for SAS student file, CSSSTUD, and course request file, CSSREQU, respectively (see Appendix A.2.4).

The "CONVERT" utility was used to create a CSSSTUD file according to its FDL specification and to load the download student demographic data into CSSSTUD. Each record in the download file was inserted into CSSSTUD based on the specified index key. The content of the record was not changed except that spaces were appended to adjust the record length to 330 characters. "CONVERT" disallowed any other data manipulation within a record. The course request data were similarly loaded using "CONVERT" except that record padding was unnecessary.

8.0 SUMMARY AND RESULTS

The procedure used to establish the student and course request data bases was successful. Beyond coping with the limited record length that was encountered during downloading from the SERIES/1, during data manipulation in the IBM/PC and during data transfer from the RAINBOW and the VAX, technical problems encountered were expected and attributable to lack of experience with the machines. A major nuisance was the amount of manual intervention in downloading from the SERIES/1. In general, the procedure was rather long-winded. Hence, this method of data transfer from the mainframe to the VAX would not be practical for frequent applications. For such applications, simpler (more direct) methods of data transfer from mainframe to VAX should be investigated.

APPENDIX A.1 OVERALL COMMUNICATION FLOW DIAGRAM


IBM 4341
VM/CMS
VSERJE
(BSC interface)
IBM
SERIES/1
IBM 3101 EMULATION PROGRAM
(RS232 interface)
IBM PC
DOS
diskette
file
DEC
RAINBOW 100
POLY-COM
(RS232 interface)
VAX 11/725
VAX/VMS
RMS
UTILITY
SAS
Data Base

APPENDIX A.2.1 IBM 4341 DATA

Record format of student file created from data downloaded from the mainframe to the SERIES/1:

FIELD	BYTES	TYPE	CHARS	
1	15	A	15	* EPSB ID
2	11	A	11	* FIRST NAME
3	10	A	10	* SECOND NAME
4	16	A	16	* SURNAME
5	1	A	1	* SEX
6	20	A	20	* ADDRESS
7	7	A	7	* POSTAL CODE
8	7	A	7	* TELEPHONE
9	1	A	1	* MAIL CODE
10	9	A	9	* AE ID
11	3	A	3	* PREV SCHOOL
12	2	A	2	* PREV GRADE
13	1	A	1	* INST TYPE
14	1	A	1	* PROGRAM
15	3	A	3	* ROOM
16	3	A	3	* REQSCH
17	2	A	2	* REQGRD
18	1	A	1	* INST TYPE
19	1	A	1	* PROGRAM
20	3	A	3	* ROOM
21	5	A	5	* REQ 1
22	5	A	5	* REQ 2
23	5	A	5	* REQ 3
24	5	A	5	* REQ 4
25	5	A	5	* REQ 5
26	5	A	5	* REQ 6
27	5	A	5	* REQ 7
28	5	A	5	* REQ 8
29	5	A	5	* REQ 9
30	5	A	5	* REQ 10
31	5	A	5	* REQ 11
32	5	A	5	* REQ 12
33	5	A	5	* REQ 13
34	4	I	9	* ID #
35	1	I	2	* DEMO2 FLAG
36	1	I	2	* REQUS FLAG
37	1	I	2	* SPECIFIC COURSE FLAG
38	10	A	10	* USER
39	4	I	5	* USER
40	2	A	2	* USER
41	5	A	5	* SURNAME INIT.
42	1	A	1	* FIRST INIT.
43	1	A	1	* SECOND INIT.
44	2	A	2	* MM
45	2	A	2	* DD
46	2	A	2	* YY
47	2	A	2	* SYN

APPENDIX A.2.2 SERIES/1 DATA

Record formats of student and course request files created in the SERIES/1 and downloaded to an IBM/PC:

Course Request Record

Field	Ln	Value
REQU.STUDENTID	9	
REQU.SCHLYEAR	4	1984
REQU.CRSEID	6	
REQU.REQPRIO	1	H
FILLER	14	
REQU.FILLSTATUS	1	I
REQU.SEX	1	
FILLER	44	

Student Record 1

Field	Ln	Value
STUD.STUDENTID	9	
STUD.LASNAME	18	
STUD.GIVNAME	14	
STUD.CALNAME	8	
STUD.ADDRLIN1	25	
FILLER	6	

Student Record 2

Field	Ln	Value
STUD.STUDENTID	9	
STUD.ADDRLIN2	25	
STUD.CITY	18	EDMONTON
STUD.PROVINCE	4	ALTA
STUD.POSTCODE	9	
STUD.AREACODE	3	
STUD.PHONE	7	
FILLER	5	

Student Record 3

Field	Ln	Value
STUD.STUDENTID	9	
FILLER	25	
STUD.SEX	1	
STUD.BIRTHDATE	8	
FILLER	34	
STUD.STATUS	1	A
FILLER	2	

Student Record 4

Field	Ln	Value
STUD.STUDENTID	9	
STUD.GRADE	2	
STUD.SCHLYEAR	4	84
FILLER	24	
STUD.ADMDATE	8	19840901
STUD.ADMCODE	1	D
FILLER	32	

APPENDIX A.2.3 IBM/PC DATA

Record formats of student and course request files created in the IBM/PC:

Course Request Record

Field	Ln	Value
REQU.STUDENTID	9	
REQU.SCHLYEAR	4	1984
REQU.CRSEID	6	
REQU.REQPRIO	1	H
FILLER	14	
REQU.FILLSTATUS	1	I

Student Record

Field	Ln	Value
STUD.STUDENTID	9	
STUD.LASNAME	18	
STUD.GIVNAME	14	
STUD.CALNAME	8	
STUD.ADDRLIN1	25	
STUD.ADDRLIN2	25	
STUD.CITY	18	EDMONTON
STUD.PROVINCE	4	ALTA
STUD.POSTCODE	9	
STUD.AREACODE	3	
STUD.PHONE	7	
FILLER	25	
STUD.SEX	1	
STUD.BIRTHDATE	8	
FILLER	34	
STUD.STATUS	1	A
STUD.GRADE	2	
STUD.SCHLYEAR	4	1984
FILLER	24	
STUD.ADMDATE	8	19840901
STUD.ADMCODE	1	D
FILLER	6	

APPENDIX A.2.4 SAS DATA

Record formats of student and course requests files in SAS:

```
(REQU)                          !MAP FOR CSSREQU
REQU.STUDENTID=9%               !STUDENT ID:
REQU.SCHLYEAR=4%                !SCHOOL YEAR:
REQU.CRSEID=6%                  !<COURSE ID>
REQU.REQPRIO=1%                 !<PRIORITY>
REQU.ALTCRSEID=6%               !<ALTERNATE>
REQU.ASGNCRSEID=6%              !<ASSIGNED COURSE>
REQU.ASGNSECNO=2%               !<ASSIGNED SECTION>
REQU.FILLSTATUS=1%              !<FILLING STATUS>
```

APPENDIX A.3 IBM/PC PROGRAM LISTINGS

```
100  REM Program ID : STUDFM.BAS
110  REM
120  REM Program : File Extraction
130  REM
140  REM Purpose : This program extracts student data
150  REM           downloaded from an IBM SERIES/1
160  REM           to an IBM PC.
170  REM
180  REM Input : File #1 - downloaded student data
190  REM
200  REM Output : File #2 - student data
210  REM
220  REM Processing.
230  REM
240  REM      Once initiated, this program requires the
250  REM      user to enter the input and output file
260  REM      names. If the output file already exist,
270  REM      its content will be over written. This
280  REM      program examines input records. Records
290  REM      which do not begin with a numeric character
300  REM      are ignored. Other records are written to
310  REM      output file unchanged.
320  REM
330  REM
1000  INPUT "ENTER INPUT FILE : ",INFILE$
1010  OPEN INFILE$ FOR INPUT AS #1
1020  INPUT "ENTER OUTPUT FILE : ",OUTFILE$
1030  OPEN OUTFILE$ FOR OUTPUT AS #2
1040  INCTR = 0
1050  OUTCTR = 0
1060  WHILE NOT EOF(1)
1070       LINE INPUT #1,RECORD$
1080       INCTR = INCTR + 1
1090       DT$ = LEFT$(RECORD$,1)
1100       IF DT$ < "0" OR DT$ > "9" THEN GOTO 1130
1110       PRINT #2,RECORD$
1120       OUTCTR = OUTCTR + 1
1130  WEND
1140  CLOSE #1,#2
1150  PRINT "   RECORDS READ : ";INCTR
1160  PRINT "RECORDS WRITTEN : ";OUTCTR
1170  END
```

```
100  REM Program ID : STUDPTCH.BAS
110  REM
120  REM Program : Student Record Create
130  REM
140  REM Purpose : This program joins segments of
150  REM           student data to create student
160  REM           records suitable for loading into
170  REM           the SIERRA system.
180  REM
190  REM Input : File #1 - first part of student data
200  REM         File #2 - second part of student data
210  REM         File #3 - third part of student data
220  REM         File #4 - fourth part of student data
230  REM
240  REM Output : File #5 - complete student record
250  REM
260  REM Processing.
270  REM
280  REM      This program iteratively reads a record
290  REM      from each input file. The four records
300  REM      read should belong to one student. This
310  REM      is identified by the student identification
320  REM      numbers in the four records. If these
330  REM      numbers are inconsistent, the program
340  REM      absorts with appropriate messages displayed.
350  REM      Data in student records are joinned to
360  REM      form a student record suitable for loading
370  REM      to the SIERRA school system. Grades which
380  REM      are less than grade 10 are adjusted to be
390  REM      grade 9.
400  REM
410  REM
1000  OPEN "I", #1, "STUD1.DAT"
1010  OPEN "I", #2, "STUD2.DAT"
1020  OPEN "I", #3, "STUD3.DAT"
1030  OPEN "I", #4, "STUD4.DAT"
1040  OPEN "O", #5, "STUD.DAT"
1050  COUNT = 0
1060  WHILE NOT EOF(1)
1070       LINE INPUT #1, STUD1$
1080       LINE INPUT #2, STUD2$
1090       LINE INPUT #3, STUD3$
1100       LINE INPUT #4, STUD4$
1110       ID1$ = LEFT$(STUD1$,9)
1120       ID2$ = LEFT$(STUD2$,9)
1130       ID3$ = LEFT$(STUD3$,9)
1140       ID4$ = LEFT$(STUD4$,9)
1150       IF ID1$ <> ID2$ THEN GOTO 1360
1160       IF ID1$ <> ID3$ THEN GOTO 1380
1170       IF ID1$ <> ID4$ THEN GOTO 1400
```

```
1180        SEG1$ = LEFT$(STUD1$,74)
1190        SEGX$ = LEFT$(STUD2$,75)
1200        SEG2$ = RIGHT$(SEGX$,66)
1210        SEG21$ = LEFT$(SEG2$,50)
1220        SEGX$ = RIGHT$(SEG2$,15)
1230        SEG22$ = LEFT$(SEGX$,3)
1240        SEG23$ = RIGHT$(SEGX$,12)
1250        SEGX$ = LEFT$(STUD3$,78)
1260        SEG3$ = RIGHT$(SEGX$,69)
1270        SEGX$ = LEFT$(STUD4$,54)
1280        SEGX$ = RIGHT$(SEGX$,45)
1290        GRADE$ = LEFT$(SEGX$,2)
1300        SEG4$ = RIGHT$(SEGX$,43)
1310        IF GRADE$ < "10" THEN GRADE$ = "09"
1320        PRINT #5,USING "&";SEG1$+SEG21$+SEG22$+" "+SEG23$+SEG3$+GRADE$+SEG4$
1330        COUNT = COUNT + 1
1340  WEND
1350  GOTO 1410
1360  PRINT "STUDEND ID MISMATCH IN FILE STUD2.DAT : ABORTED"
1370  GOTO 1410
1380  PRINT "STUDENT ID MISMATCH IN FILE STUD3.DAT : ABORTED"
1390  GOTO 1410
1400  PRINT "STUDENT ID MISMATCH IN FILE STUD4.DAT : ABORTED"
1410  PRINT "RECORDS WRITTEN :";COUNT
1420  CLOSE #1,#2,#3,#4,#5
1430  END
```

```
100  REM Program ID : STUDCOPY.BAS
110  REM
120  REM Program : File Copy
130  REM
140  REM Purpose : This program extracts student data
150  REM           to a number of smaller files.
160  REM
170  REM Input : File #1 - source file
180  REM
190  REM Output : File #2 - output file
200  REM
210  REM Processing.
220  REM
230  REM      Once initiated, this program requires the
240  REM      user to enter the source file name, the
250  REM      maximum number of records to copy to an
260  REM      output file and the file name of the first
270  REM      output file. Records are copied to the
280  REM      output file until eof or the maximum number
290  REM      of records has been copied to the output
300  REM      file. If eof has not been reached, the user
310  REM      is required to enter the file name of the
320  REM      next output file. This process continues
330  REM      until eof is reached.
340  REM
350  REM
1000  INPUT "ENTER INPUT FILE : ",INFILE$
1010  OPEN INFILE$ FOR INPUT AS #1
1020  INPUT "ENTER MAXIMUM NUMBER OF RECORD / OUTPUT FILE : ",MAX
1030  INPUT "ENTER FIRST OUTPUT FILE : ",OUTFILE$
1040  OPEN OUTFILE$ FOR OUTPUT AS #2
1050  CTR = 0
1060  INCTR = 0
1070  OUTCTR = 0
1080  WHILE NOT EOF(1)
1090       INPUT #1,RECORD$
1100       INCTR = INCTR + 1
1110       CTR = CTR + 1
1120       IF CTR > MAX THEN GOSUB 1200
1130       PRINT #2,RECORD$
1140       OUTCTR = OUTCTR + 1
1150  WEND
1160  CLOSE #1,#2
1170  PRINT "   RECORDS READ : ";INCTR
1180  PRINT "RECORDS WRITTEN : ";OUTCTR
1190  END
1200  CLOSE #2
1210  INPUT "OUTPUT FILE FULL - ENTER NEXT OUTPUT FILE NAME : ",OUTFILE$
1220  OPEN OUTFILE$ FOR OUTPUT AS #2
1230  CTR = 1
1240  RETURN
```

```
100  REM Program ID : STUDREQU.BAS
110  REM
120  REM Program : Student Request Conversion
130  REM
140  REM Purpose : This program modifies student course
150  REM           requests according to various criteria.
160  REM
170  REM Input : File #1 - source file
180  REM
190  REM Output : File #2 - output file
200  REM
210  REM Processing.
220  REM
230  REM      This program examines each course request
240  REM      and if required, performs one of the
250  REM      following conversions.
260  REM      1. For female student, course "14450" is
270  REM         changed to "14451", "24450" to "24451"
280  REM         and "34450" to "34451".
290  REM      2. For student requesting course "1425B",
300  REM         an additional request is recreated for
310  REM         course "1426B". Similarly, "1425W" is
320  REM         created for "1425W", "2426B" for "2425b",
330  REM         "2426W" for "2425W", "3426B" for "3425B"
340  REM         and "3426W" for "3425B".
350  REM      3. A course ending with a numeric digit
360  REM         less than 9 has that digit replaced by 0.
370  REM
380  REM
1000 INPUT "ENTER INPUT FILE NAME : ",INFILE$
1010 OPEN INFILE$ FOR INPUT AS #1
1020 INPUT "ENTER OUTPUT FILE NAME : ",OUTFILE$
1030 OPEN OUTFILE$ FOR OUTPUT AS #2
1040 INCTR = 0
1050 OUTCTR = 0
1060 WHILE NOT EOF(1)
1070      LINE INPUT #1,RECORD$
1080      INCTR = INCTR + 1
1090      FLD$ = LEFT$(RECORD$,36)
1100      PARTI$ = LEFT$(FLD$,13)
1110      PARTX$ = RIGHT$(FLD$,23)
1120      COURSE$ = LEFT$(PARTX$,5)
1130      PART2$ = RIGHT$(FLD$,18)
1140      IF COURSE$ = "14450" THEN GOSUB 1320: GOTO 1270
1150      IF COURSE$ = "24450" THEN GOSUB 1360: GOTO 1270
1160      IF COURSE$ = "34450" THEN GOSUB 1400: GOTO 1270
1170      IF COURSE$ = "1425B" THEN GOSUB 1440: GOTO 1270
```

```
1180      IF COURSE$ = "1425W" THEN GOSUB 1480: GOTO 1270
1190      IF COURSE$ = "2425B" THEN GOSUB 1520: GOTO 1270
1200      IF COURSE$ = "2425W" THEN GOSUB 1560: GOTO 1270
1210      IF COURSE$ = "3425B" THEN GOSUB 1600: GOTO 1270
1220      IF COURSE$ = "3425W" THEN GOSUB 1640: GOTO 1270
1230      LAST$ = RIGHT$(COURSE$,1)
1240      FIRST$ = LEFT$(COURSE$,4)
1250      IF LAST$ > "0" AND LAST$ < "9" THEN COURSE$ = FIRST$ + "0"
1260      GOSUB 1680
1270 WEND
1290 CLOSE #1,#2
1290 PRINT "   RECORDS READ : ";INCTR
1300 PRINT "RECORDS WRITTEN : ";OUTCTR
1310 END
1320 SEX$ = RIGHT$(PART2$,1)
1330 IF SEX$ = "F" THEN COURSE$ = "14451"
1340 GOSUB 1680
1350 RETURN
1360 SEX$ = RIGHT$(PART2$,1)
1370 IF SEX$ = "F" THEN COURSE$ = "24451"
1380 GOSUB 1680
1390 RETURN
1400 SEX$ = RIGHT$(PART2$,1)
1410 IF SEX$ = "F" THEN COURSE$ = "34451"
1420 GOSUB 1680
1430 RETURN
1440 GOSUB 1680
1450 COURSE$ = "1426B"
1460 GOSUB 1680
1470 RETURN
1480 GOSUB 1680
1490 COURSE$ = "1426W"
1500 GOSUB 1680
1510 RETURN
1520 GOSUB 1680
1530 COURSE$ = "2426B"
1540 GOSUB 1680
1550 RETURN
1560 GOSUB 1680
1570 COURSE$ = "2426W"
1580 GOSUB 1680
1590 RETURN
1600 GOSUB 1680
1610 COURSE$ = "3426B"
1620 GOSUB 1680
1630 RETURN
1640 GOSUB 1680
1650 COURSE$ = "3426W"
1660 GOSUB 1680
1670 RETURN
1680 PRINT #2,PART1$+COURSE$+PART2$
1690 OUTCTR = OUTCTR + 1
1700 RETURN
```

APPENDIX A.4 VAX RMS UTILITY FOR DATA CONVERSION

```
IDENT   10-DEC-1984 13:24:00    VAX-11 FDL Editor

SYSTEM
        SOURCE                  VAX/VMS

FILE
        ORGANIZATION            indexed

RECORD
        CARRIAGE_CONTROL        carriage_return
        FORMAT                  fixed
        SIZE                    35

AREA 0
        ALLOCATION              2400
        BEST_TRY_CONTIGUOUS     yes
        BUCKET_SIZE             3
        EXTENSION               240

AREA 1
        ALLOCATION              80
        BEST_TRY_CONTIGUOUS     yes
        BUCKET_SIZE             3
        EXTENSION               8

AREA 2
        ALLOCATION              1450
        BEST_TRY_CONTIGUOUS     yes
        BUCKET_SIZE             8
        EXTENSION               145

AREA 3
        ALLOCATION              20
        BEST_TRY_CONTIGUOUS     yes
        BUCKET_SIZE             8
        EXTENSION               2

KEY 0
        CHANGES                 no
        DATA_AREA               0
        DATA_FILL               80
        DUPLICATES              no
        INDEX_AREA              1
        INDEX_FILL              80
        LEVEL1_INDEX_AREA       1
        PROLOGUE                2
        SEG0_LENGTH             19
        SEG0_POSITION           0
        TYPE                    string

KEY 1
        CHANGES                 yes
        DATA_AREA               2
        DATA_FILL               80
        DUPLICATES              yes
        INDEX_AREA              3
        INDEX_FILL              80
        LEVEL1_INDEX_AREA       3
        SEG0_LENGTH             6
        SEG0_POSITION           13
        TYPE                    string
```

```
TITLE   cssstud fdl created at 12-04-1984

IDENT    7-DEC-1984 10:13:57    VAX-11 FDL Editor

SYSTEM
        SOURCE                        VAX/VMS

FILE
        ORGANIZATION                  indexed

RECORD
        CARRIAGE_CONTROL              carriage_return
        FORMAT                        fixed
        SIZE                          330

AREA 0
        ALLOCATION                    3050
        BEST_TRY_CONTIGUOUS           yes
        BUCKET_SIZE                   10
        EXTENSION                     305

AREA 1
        ALLOCATION                    25
        BEST_TRY_CONTIGUOUS           yes
        BUCKET_SIZE                   10
        EXTENSION                     2

AREA 2
        ALLOCATION                    350
        BEST_TRY_CONTIGUOUS           yes
        BUCKET_SIZE                   5
        EXTENSION                     35

AREA 3
        ALLOCATION                    15
        BEST_TRY_CONTIGUOUS           yes
        BUCKET_SIZE                   5
        EXTENSION                     1

KEY 0
        CHANGES                       no
        DATA_AREA                     0
        DATA_FILL                     80
        DUPLICATES                    no
        INDEX_AREA                    1
        INDEX_FILL                    80
        LEVEL1_INDEX_AREA             1
        NAME                          stud.studentid
        PROLOGUE                      2
        SEG0_LENGTH                   9
        SEG0_POSITION                 0
        TYPE                          string

KEY 1
        CHANGES                       yes
        DATA_AREA                     2
        DATA_FILL                     80
        DUPLICATES                    yes
        INDEX_AREA                    3
        INDEX_FILL                    80
        LEVEL1_INDEX_AREA             3
        NAME                          stud.lasname
        SEG0_LENGTH                   10


        SEG0_POSITION                 9
        TYPE                          string
```

APPENDIX 6: RECENT SYSTEM DEVELOPMENTS

Hands on testing work for this project was completed in spring, 1985. Since then, there have been some product announcements that may influence minicomputer users.

A. VAX Computer Announcements

On May 16th, 1985, Digital Equipment announced the Micro Vax II. This is a powerful 32 user computer with 70 to 210 Megabytes of disk storage, 90 Mbytes tape cartridge backup and a processor speed of 1 million instructions per second making it nearly three times as fast, for CPU-bound activities, as the VAX 11/725 used for the trials. The starting price is given as 25 thousand dollars. The MicroVAX II also supports 5 1/4 inch diskettes and up to 9 Megabytes of memory.

At the same time, Digital announced the interconnection software and hardware for IBM PC/AT computers to be attached as intelligent terminals. PCDOS files can be transferred to the host VAX computer and VAX/VMS files can be sent out to the IBM PC/AT computers.

B. VAX-based Software

Since completing the report, Edmonton Public Schools has received some information about the Systems Eleven school information management system. This product, which appears to have the backing of Digital Equipment is being evaluated by the Calgary Board of Education and many school districts in Ontario.

The Systems Eleven package provides the following functions:

Student registration and scheduling, grade reporting, transcripts, daily and class attendance, accounting and child tracking. In addition, it provides a companion financial services package that has personnel and payroll software, fixed assets, inventory and census and taxes accounting.

Whilst the package would appear to be a centralized solution, the addition of intelligent terminals such as IBM PC computers would allow a measure of distributed data management.

C. IBM Series 1 Computer Announcements

IBM has announced a Series 1 co-processor board for the PC/AT microcomputer. The board provides full support for the Series 1 instruction set and EDX Operating System. Mid-American have stated that the PROMPT/PASS packages will run on the IBM PC/AT using this board.

D. Series 1 Based Software

Mid-American will be releasing an updated version of the Prompt database management system with a fully integrated high level language interface to EDL (Operating System Command Language). There will also be B-Tree (balanced tree) data base algorithms and access to an unlimited number of files.